FOOD MANUFACTURE

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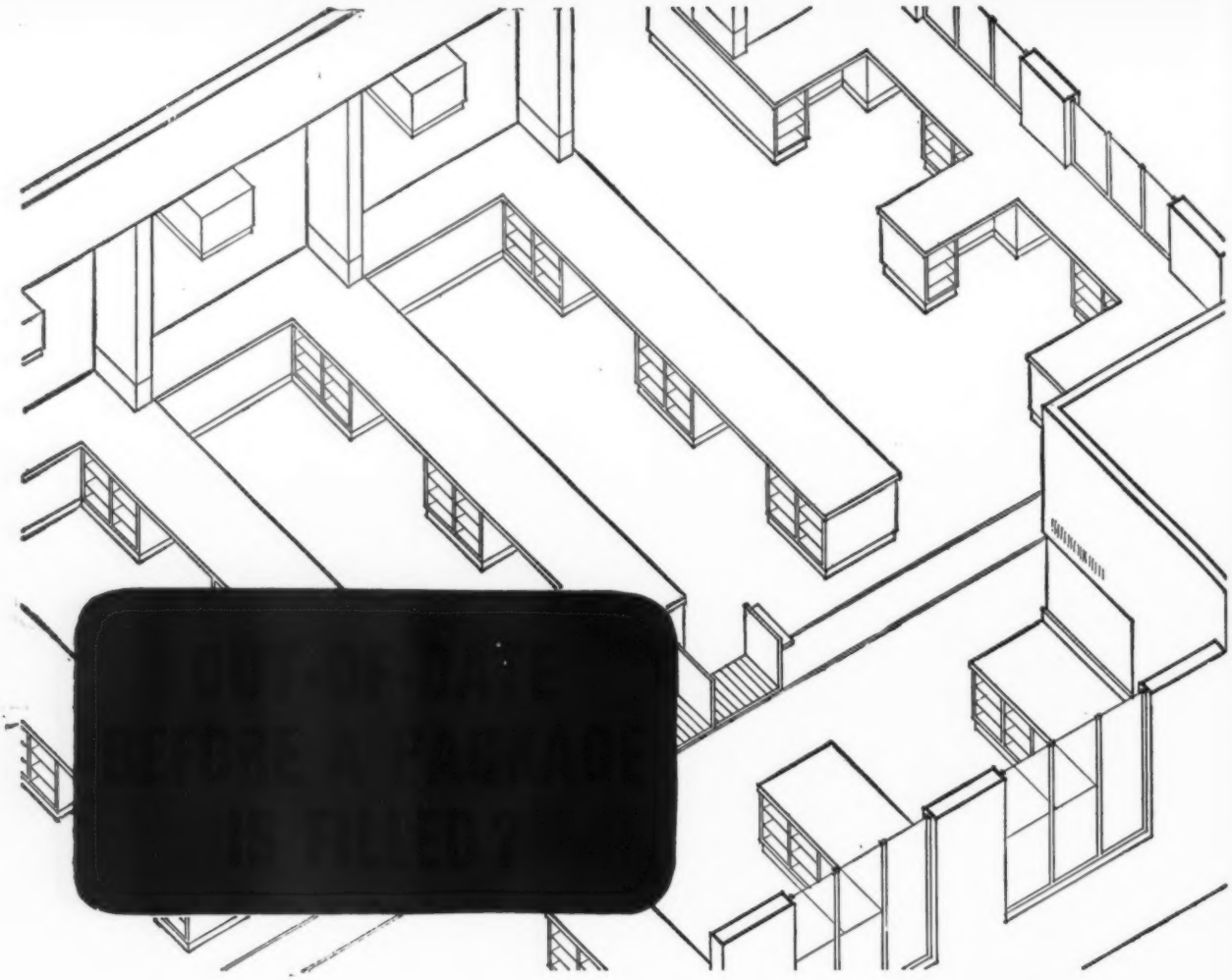

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FOOD MANUFACTURE

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FOOD MANUFACTURE

Vol. XXVII, No. 7 July 1, 1952

Promotion of British Productivity

THE founding of the Anglo-American Council on Productivity was a milestone in the history not only of British industry but also in the relations between British and American industry, declared the President of the Board of Trade, the Rt. Hon. Peter Thorneycroft, M.P., in his speech at a dinner given by the Council.

In an admirable summary of the effect of the Council's work, he said it had done four main things. Firstly, it had taught us a good deal about new techniques of management and production. Secondly, it had taught us something which was almost a moral lesson, the importance of the open mind and the open door in the learning and sharing of industrial techniques, for the American businessman seemed to have very few inhibitions about exchanging know-how—even with his closest competitors.

Thirdly, there was the shock effect which this operation had had in bringing home to British industry the fact that American productivity was on the average higher than the British in many industries and plant, that there was nothing mysterious or intangible about the reasons why it was higher, and that with the application of intelligence and goodwill to our own problems, there was no reason why British productivity should not be very considerably raised. In studying productivity, the gap between the most efficient and the least efficient was astonishing. The Council have shown that that gap was not a cause for despair but a measure of our opportunity.

Fourthly, it had not worked one way only. It had been a two-way traffic. The British teams had been able to carry some ideas with them to America and the reverse teams from the States who had visited this country had returned feeling that they had learnt a great deal.

This task of the study of American industry was now largely completed and the United Kingdom section of the Council, recognising the value of the work done, had considered the methods whereby the effort should continue. It had in mind a new approach, based essentially on British genius and experience, fortified by consultation in the last four years.

The instrument was to be known as the British Productivity Council. Its general purpose was to ensure the continued study by everybody representing management or workers of methods for securing greater productivity, including all the recommendations in the reports of the teams sponsored by the Anglo-American Council. It would not be content with blue prints; it would continue the effort to convert plans into practice over the widest possible field.

In its work it would find ways and means of securing harmonious co-operation from all other bodies with similar aims. These organisations were a symbol of the importance which Government, management, and workers attributed to productivity. Co-operation between the employers and workers to enable them to do the job together was the primary consideration, and the British Productivity Council could count on the backing of H.M. Government.

Canning Statistics

AN interesting paper on the statistics of the canning industry was read by Mr. J. Ryan before the Royal Statistical Society at one of their recent meetings. Beginning with a consideration of the main raw material, tinplate, the author went on to present the statistics available on can manufacture, with particular emphasis on the food canning industry.

Of the 482,000 tons of tinplate delivered to the home market in 1951, 270,000 tons were used for containers or closures for food. The tinplate used for purposes other than food packing was "waster" plate, which would be unsuitable for the packing of food. Containers for processed food accounted for 136,000 tons of tinplate.

The development of high-speed manufacture of food cans had facilitated the birth and growth of the British canning industry, and the conservation of home processed fruit, vegetables, milk, and fish.

The industry was not well documented statistically, and Census of Production statistics appeared to be the only published ones available.

The policy of standardisation of the sizes of food cans, and of the diameters of other containers had done much to increase the productivity of the industry, and to reduce costs and prices. Thus at present fruit was canned in only one of the five stan-

dard size cans, and vegetables (other than baked beans) were restricted to six sizes.

The disposal of scrap cans was, at present, a live issue, in view of the shortage of steel scrap. The author estimated that there was a potential of recoverable scrap cans of about 400,000 tons, of which less than a third was being salvaged and of which less than 5 per cent. was being de-tinned.

Since 1924 the U.K. production of canned food had risen as follows: Canned fruit from 5,600 tons in 1924 to 74,300 tons in 1951; canned vegetables from 1,000 tons to 298,000 tons; canned soups from 1,000 tons to 70,300 tons; canned fish from 7,600 tons to 17,000 tons; and canned milk from 38,300 tons to 78,000 tons. Imports of canned fruit (particularly peaches, pineapples, apricots, etc.) and canned fish (particularly salmon) had declined substantially since pre-war, but imports of canned vegetables and canned meats had increased.

In all, nearly three times as much canned food was consumed in 1951 compared with 1924 (1,106,900 tons compared with 401,600 tons) representing a consumption of 49·4 lb. of canned food per head in 1951. On the other hand, present consumption in the U.S.A. was about 83 lb. per head per year.

The author concluded with an estimate of the future world supply and demand for tinplate. He demonstrated that although the capacity to manufacture tinplate was increasing rapidly in many countries (particularly in the U.S.A.) the demand would continue to exceed supply for many years ahead. The increasing world demand for food, the increasing production of foods which could only be conserved by canning for out-of-season consumption, the increased demand for all types of consumer foods, which would accompany a rising standard of living throughout the world, all pointed to a sustained and increasing demand for containers manufactured from tinplate, and at present it appeared that the tinplate necessary to make them would not be available.

To Have or Have Not

BECAUSE Britain remains rationed for so many basic foodstuffs, it is commonly assumed here that the world's food is now better divided than in the pre-1939 period. This is far from the truth. Totally there is less food per head in the world, but more of it is going to some nations and less than ever to others. The rich are richer, the poor poorer. Britain's post-war position merely reflects the fact that she has dropped down in the world ladder of wealth. These stark facts emerge only too clearly from new United Nations reports—the World Economic Report, 1950-51, and the Report on the World Social Situation.

The most hopeful sign is the effect of modern disease control and prevention, which often increases production by releasing farm workers and peasants from their bondage to endemic disease. Thus in one part of Pakistan the control of malaria brought about a 15 per cent. increase in rice harvests, though no technical steps to improve rice yields had actually been taken. However, disease control is double-edged. To quote from the Social Situation U.N. Report: ". . . efforts to improve health standards will, it seems, save men, women, and children from disease only to let them die of starvation."

The world has yet to look its own food facts squarely and bravely in the face. There is less food per head in Asia—especially in South-East Asia—than before the war. More food is being consumed in the United States, Australia, and New Zealand. It is perhaps rather unfair to make this point without at the same time stating that New Zealand also exports more food per head than does any other country.

The increase in food production that Africa, Asia, and Latin America must achieve to bring about any real improvement in this world situation is enormous; small gains of a 10 per cent. nature would be quite insignificant, and twofold or threefold increases are needed. But progress is slow while the advances in productivity by industrial nations are rapid; worse still, it is in the under-developed countries that populations are rising the fastest. The ghost of the Reverend Thomas Malthus still walks. Those who maintain that scientific advances will continue to invalidate his prophecies might well reflect that theories provide more food only when they are put into practice.

Cattle Ranching in Scotland

THE visit of Lord Malcolm Douglas-Hamilton to America, which we recorded in February, 1952, has been successful in that he has been able to raise the capital necessary for the formation of the Prince Charles Highland Development Corporation, whose primary interest will be the development of beef ranching on American lines. This body will open offices in Inverness and New York. Colonel V. W. Treager will be in charge in Inverness.

A certain degree of opposition has been met with from local interests and from crofters, who contend that the development of beef production on a large scale can safely be left to the Highlanders themselves, provided sufficient support is given in the way of tax alleviation and other inducements.

There are conflicting views concerning the feasibility of large scale ranching methods; only time can show whether imported methods plus local knowledge can achieve the desired objective of renewing beef stocks in the Highlands.

Sugar Technology in South Africa

RECENT developments in South Africa's sugar industry and the problems of its future expansion were the subject of an address by Dr. T. S. H. Rossouw, chairman of the Sugar Industry Central Board, who officially opened the 26th Annual Congress of the South African Sugar Technologists' Association, a full report of which is published in the June, 1952, issue of *World Crops*.

During the past half century, local consumption had increased remarkably, and further expansion was urgently necessary to satisfy local demands and to retain a place in the Commonwealth export market. Although a target of 725,000 tons had been set for the 1952 crop, this could not be attained, principally because of the effects of three years' deficient rainfall.

Dr. Rossouw suggested the possibility of organising the growing of sugar cane in suitable parts of the native reserves in the coastal belt of Natal. Success could be achieved in this respect with the encouragement of the Native Administration Authorities.

Following the opening proceedings when the President of the Association, Mr. G. C. Dymond, spoke on the subject of the utilisation of organic wastes, a series of papers on technological and agricultural subjects was read.

Australian Meat for Britain

A MEAT agreement between Britain and Australia covering 15 years from July 1, 1952, has been tabled in Australia's House of Representatives. The agreement specifies that both countries are to endeavour to develop meat production in Australia and increase meat export. Australia undertakes to use her best endeavours to maintain the present volume of exports and to bring about a steadily increasing volume. In return Britain will provide a satisfactory market in the U.K. for the whole of Australia's exportable surplus during the currency of the agreement.

The pact commits Australia to promotion of development programmes, subject to shortages of materials, equipment, manpower, defence, and other essential undertakings, while the U.K. is committed to take all practical steps to facilitate the supply of material and equipment.

The two Governments have made a detailed agreement in respect of beef and veal for the period ending September, 1958, and for mutton and lamb for the period ending June, 1955. The agreed schedule of prices for beef and veal for the year ending September 30, 1952, will be the initial schedule for the purpose of the detailed agreement. The schedule will be reviewed annually, not later than July 31, but in no year will the level of prices be lower than the schedule ruling for 1950-51.

At each price review, Australia is to present to the U.K. figures showing any variation in production costs and justify the data used and calculation methods adopted in preparing the figures.

Further conditions of the beef and veal agreement provide for price increases based on higher production costs; the provisions of the beef agreement apply to the lamb agreement, except that the period will be to June, 1955, instead of September, 1958. An agreement will be made for mutton under the same conditions as for lamb, except that in prices, the principal basis will be the relationship to lamb prices. This relationship will be calculated to encourage production of first quality mutton, with appropriate differentials for grades. In determining the differentials, regard will be paid to those which have ordinarily existed between the grades of mutton on the free market.

The general agreement provides that if at the termination of a detailed agreement the U.K. is no longer the sole importer of meat from Australia, the former will permit the exportable surplus meat from Australia to be sold in the U.K. market without restriction of quantity, and that a schedule of minimum prices will be fixed. This schedule will be operated by comparing it with the average prices obtained in the market over agreed periods. If necessary, there will be special provision to ensure that a satisfactory part of the prices reaches the producers.

The operation of the agreement will be reviewed in 1955 and thereafter annually. If in the opinion of either Government it appears to fail in its purpose, the two Governments will consult with a view to appropriate action. In the event of an alteration in the exchange rate, either Government will have the right to call for an immediate review of the then current price.

Preservation of Milk by Radiation

A STUDY of the effect of X- and γ-radiations on raw food products has been undertaken by E. L. Gaden, Jr., E. J. Henley, and B. P. Collins of Columbia University (*Food Technology*, **5**, 12, 506). They have presented the results of work carried out to determine the effects of 2 m.e.v. X-rays on unpasteurised milk.

After describing their experimental procedure and discussing its results, the authors record the conclusion that samples of raw milk treated with 2 m.e.v. X-rays at dosages up to about 100,000 R remained unchanged in appearance and organoleptic properties after irradiation. At higher radiation levels the milk began to acquire an undefined off-flavour, although dosages up to $1{\cdot}83 \times 10^6$ R resulted in no apparent physical changes in the samples. Storage life of the irradiated milk was greatly prolonged.

Samples receiving dosages of 36,400 and 73,000 R were kept saleably fresh at 10°C. for periods 1·43 and 2·25 times as long as their respective controls. Samples held at 30°C. showed proportionate increases in storage life.

Vitamin A and riboflavin content appeared to be unimpaired at radiation levels under 146,000 R. Samples receiving dosages of 300,000 R showed a 40 per cent. decrease in riboflavin content but very little destruction of vitamin A.

The destruction curves for the bacteriological population may be reproduced by assuming a mixture of bacteria, each species of which undergoes a lethal action that may be described mathematically as a first order chemical reaction. Dosages over 40,000 R resulted in the destruction of more than 90 per cent. of the micro-organisms; 146,000 R was sufficient to destroy 99·5 per cent. of the organisms that could be detected by standard plate counts.

The results obtained in the above experiments have fulfilled the primary objectives sufficiently to indicate the advisability of continuing these researches. Work on the nature of spoilage and of the chemical changes in irradiated foods and the possible effect of irradiation on nutritional factors is now being conducted.

Copper in Foods

In a recent letter to the *B.M.J.* (May 31, 1952) Dr. G. H. Bourne calls attention to the apparently invidious distinctions drawn in the report of the Food Standards Committee's Metallic Contamination Sub-Committee relating to permitted copper in foods. He specially mentions tea which, as a universally consumed beverage, might be expected to contain the lowest amount of copper. But according to the report, the provisionally permitted amount is 150 p.p.m. Cocoa powder, widely used in drinks for children, is permitted 70 p.p.m. whereas flavourings, tomato ketchup, yeast, and yeast extract, which are consumed in minute amounts compared with tea and cocoa, are restricted to 30 p.p.m., 50 p.p.m., and 30 p.p.m. respectively. Furthermore, tomato ketchup is only permitted 50 p.p.m. but tomato purée is permitted 100 p.p.m.

As Dr. Bourne says, if the high copper content permitted in tea is unsafe, then it is unwise and dangerous to accept it; if it is safe, then the logic of insisting upon much lower limits for many foods consumed in much smaller amounts is impossible to follow.

Dr. Bourne concludes his remarks by saying that the Sub-Committee may have the best possible reasons for drawing these distinctions, but confesses to curiosity as to what they could be.

Doubtless there is an answer, and with Dr. Bourne, we should be interested to know it.

Poultry Packing in Ireland

A POULTRY plucking plant which handles 1,500 birds in an hour and a deep freezing apparatus which will make it possible to export to America and Europe greater quantities of Irish fresh frozen meat, rabbits, and liquid eggs, have been installed in Dublin.

It is claimed that, with the exception of one in Denmark, the poultry plant is the only one of its type in Europe, and this new factory is the forerunner of others to be equipped with similar plant to provide minimum handling of birds which, under a long term policy, will bring the Irish poultry packing industry to the forefront of world markets.

At present Britain is the principal buyer of Irish poultry meat, exports of which were worth nearly £4 million last year. A growing shortage of red meat has increased the demand, and to take advantage of this factor every effort is being made in Ireland to reach the highest standards in quality, appearance, and packing of the product.

The poultry plant is now making it possible to market birds attractively and, at the same time, to bring down the cost of plucking and packing so that the price of the finished article is within the reach of the lower income groups.

Two Men in a Boat

In an attempt to prove that shipwrecked persons can draw food and drink from the sea, Dr. Alain Bombard and a companion sailed from Monaco in a rubber dinghy for a ten-week trip to Cuba, their only equipment being a harpoon, a fishing rod, one or two half-litre measures, and a nylon filter, although biscuits and emergency rations were included in case the experiment failed.

It will be interesting to follow the practical testing of Dr. Bombard's theme that humans can absorb sea water up to a pint per day, provided they become acclimatised to it from the first day, thus avoiding partial dehydration. If fish is eaten, raw or cooked, says Dr. Bombard, no drinking water is necessary as fish produce 1½ pints of water for every 6½ lb. of fish eaten. To ensure no trouble from scurvy, the nylon filter plunged into the sea for an hour will yield roughly 3 oz. of plankton with its vitamin C.

His mention of plankton recalls some research from the University of Miami Marine Laboratory on possibilities of plankton sandwiches and soup claimed to be "rich in protein and calories." After all, it is argued, if a baleen whale can plunge its bulk through the mighty ocean with plankton as fuel, diminutive man should also thrive on "plankton on the plate" or "sea soup."

Since the above was written we have heard that the two scientists have sent out an SOS. They could not catch enough fish. An offer to abandon their craft and go to Marseilles by ship, however, was declined.

The Bath Oliver Biscuit

When William Oliver, M.D., F.R.S., lay dying in 1764 at his country house at Bathford, near Bath, he called to his bedside Robert Atkins, a coachman in his employ, and said: "My dear Atkins, I wish to put you in a position to obtain a livelihood when I am gone. I give you the recipe for making my biscuits. I give you a supply of ten tons of the finest wheaten flour, and one hundred pounds." It was thus that the manufacture of the famous Bath Oliver Biscuit began.

BORN at Ludgvan, Cornwall, in 1695, William Oliver studied medicine at Pembroke College, Cambridge, receiving his degree in 1725. After practising in various parts of the country, he "followed the fashion" and went to Bath in the 1730's and, in 1740, was appointed physician to the Mineral Water Hospital, now known as the Royal National Hospital for Rheumatic Diseases.

His arrival upon the Bath scene coincided with the extreme dissipation rampant among the gentry of the eighteenth century and he did not lack patients. It was considered beneficial not only to take the waters but also to indulge in fasting and abstinence. Among the few edibles allowed his patients was the Oliver Biscuit, made by the doctor in his own kitchen at Bathford.

Medical Claims for the Biscuit

The introduction of the biscuit was no ingenious device on the part of Oliver to boost his practice. He "prescribed" it purely as an adjunct to the curative treatment his patients were undergoing. The biscuit seemed to contain medicinal properties; to quote Arbuthnot: "Many have been cured of dropsy and gout by abstinence from drink, eating Oliver's biscuits which create no thirst, and strong frictions four or five times a day."

Doubtless, many modern medical practitioners will scoff at such claims for these biscuits, but they were the first fermented biscuits ever made and as such were more easily digested by the Bath *roués* than any other kind then in existence.

The Business Changes Hands

Upon Oliver's death, Atkins, his former coachman, set up business as a manufacturer in a small way at 13, Green Street, Bath,

where the biscuit was baked for immediate sale in a coffee tavern next door. Soon, Atkins was getting more orders than he could comfortably handle and, eventually, a rich man, he retired from business, passing the concern on to a man named Norris. He, in turn, sold out to a baker called Carter and, at length, after a period of 120 years and two further changes of ownership, the bakery came into the hands of James Fortt, first in the line of the well-known family of food manufacturers.

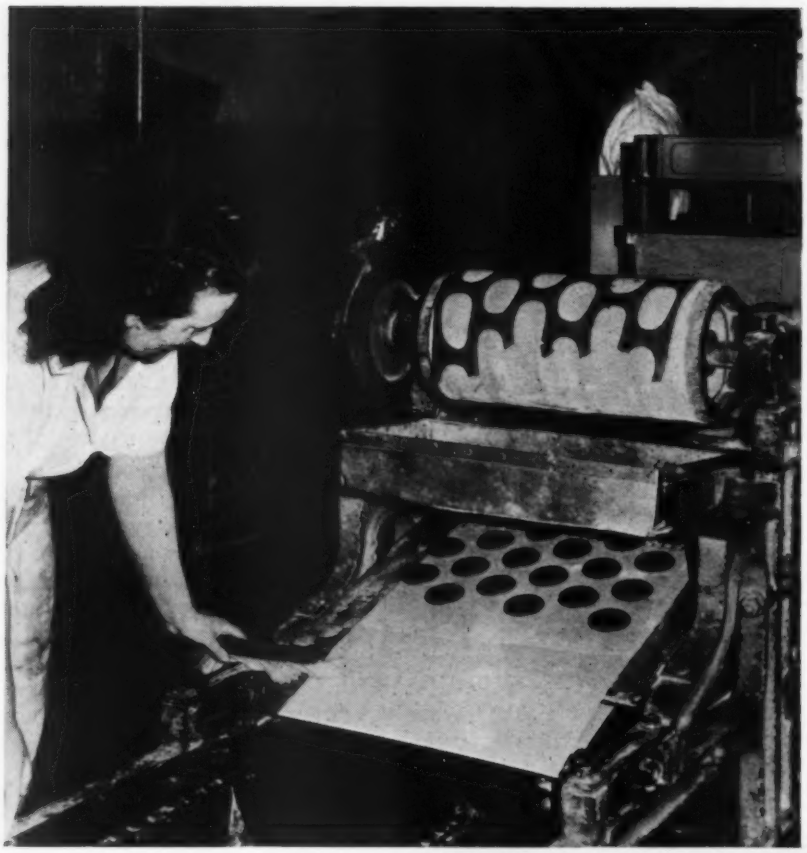
The Present Biscuit Factory

James Fortt baked the biscuits on the original site, but when his son, W. E. Fortt, took over the business, the bakery was transferred to a corner shop at Broad Street where trading is still carried on. In 1901, Fortt opened the present Bath Oliver Biscuit factory at Manvers Street, Bath.

Up to that time, only four medium sized, old-style ovens had been used; even then 17,000 biscuits were made by hand daily. Later, eight ovens were built, modern machinery was installed, and an overseas trade was begun through the agency of Crosse and Blackwell.

With the merging of the firm of James Fortt with Cater, Stoffell, and Fortt in 1920, offices were de-

The dough is passed through the breaking machine.



centralised and removed to their present site at High Street, while the factory was turned over entirely to manufacture, packing, and despatch.

Today, in the neighbourhood of 80,000 Oliver Biscuits are being made daily at the Manvers Street factory.

Manufacturing Operations

The first floor of the factory contains the main manufacturing equipment, comprising a vertical mixer, breaking machines, cutting machines, and two travelling ovens, the latter 50 feet long, gas-heated, and electrically driven.

A large, removable pan takes the soft English flour, suet, and fat to the mixing machine, the "sponge," or aerating agent, being added later. Its composition is the manufacturer's—and Dr. Oliver's—secret.

The mixing of the dry ingredients usually takes 30 minutes, but is subject to vagaries in daily and seasonal temperatures. The sponge is prepared the day before

Above: **The dough is now in sheets which are placed upon the webbing rollers of the cutting machines. It then moves along to the docking and imprint blocks.**

Right: **The baked biscuits emerge from the ovens and are placed upon trolleys for transport to the packing department.**

Below: **In the packing department the biscuits are sorted and packed into distinctive cylindrical cardboard containers.**

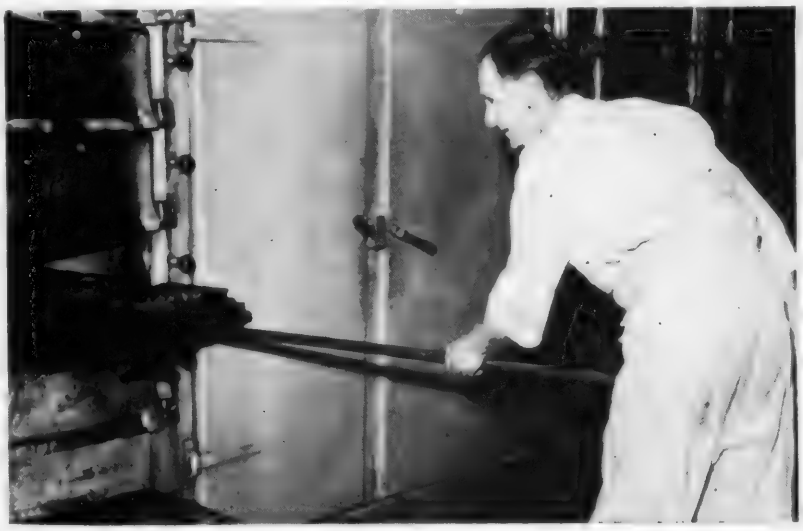
and rises overnight. After admixture with the dry ingredients, the resulting dough is transferred from the pan to wooden troughs, covered with freshly laundered cloths, and allowed to ferment for approximately one hour.

After fermentation, the troughs containing the dough are wheeled to the breaking machines. This process entails removing the dough from the troughs, placing it upon metal trays, and weighing it into pieces each of 24 lb. It is then

The mixture for Bath buns and cakes, which are also made in the factory, is transferred from the vertical mixer.

conveyed to the breaking machines and sent forwards and backwards 32 times through the rollers and folded each time until the requisite thickness is obtained. As with all the equipment at the factory, the breaking machines are electrically driven, but the folding is done by hand.

The dough in the form of sheets is then placed upon the webbing rollers of the cutting machines and move along them to the docking and imprint blocks. Cut to a circular shape with a diameter of $3\frac{1}{2}$ inches and bearing the imprint of the inventor, the unbaked biscuits are then placed in the ovens on baking wires and cooked. On emerging, they are placed upon trolleys and wheeled to the packing department, where they are sorted and packed into distinctive cylindrical cardboard containers.



A gas-fired oven used in cake production.

Effect of Raw Material Shortages

On the second floor of the factory is another oven containing a battery of 20 chambers which is not being used on biscuit production on account of the shortage of raw materials. The whole of the second floor was laid out for the purpose of installing more machinery with the view to increasing the export trade. The ovens on this floor are used to bake Bath buns and cakes for the manufacturer's home retail and wholesale trade.

SUPPLIERS OF EQUIPMENT

Weighing machines: *W. and T. Avery.*
Containers: *The Metal Box Co.; Thompson and Norris Manufacturing Co.*
Packing papers: *Powell Lane Manufacturing Co.*
Breaking machine: *James Cruickshank.*
Sundry other plant: *Thomas Collins and Co.*

New Books Register

Orders for any of the books listed below, or scientific and technical books in any language, may be placed with the Books Department,* FOOD MANUFACTURE, *17, Stratford Place, London, W.1. A selected stock of books is carried and may be inspected at the above address. Prices given do not include postage.

Burn, J. H. *Practical Pharmacology*. Blackwell. Pp. 72. 43 illustrations. 12s. 6d.

Christensen, C. M. *The Molds and Man: An Introduction to the Fungi*. Oxford University Press. Pp. 252. Illustrated. 21s.

Efficient Use of Fuel: A Textbook on Fuels and their Efficient Utilisation for use of Students and Technical Men in Industry. (Ministry of Fuel.) H.M.S.O. 21s.

Elliott, Charlotte. *Manual of Bacterial Plant Pathogens*. Annales Cryptogamici et Phytopathologici. Chronica Botanica. Pp. 186. 48s.

Ministry of Food

LATEST STATUTORY INSTRUMENTS

The list given below is the continuation of the list of Instruments published in "Food Manufacture," February 1, 1952, page 52.

No.	*Date.*	
	1951.	**PRICE FIXATION**
2231	Dec. 30.	Order amending the Butter Order, 1951.
2232	,, 30.	Order amending the Cheese Order, 1950.
2265	,, 30.	Order amending the Bacon (Control and Prices) Order, 1950. Revokes S.I. 1950, No. 1460, and S.I. 1951, Nos. 75 and 1523.
	1952.	
2311	Jan. 1.	Order amending the Milk (Control and Maximum Prices) (Great Britain) Order, 1951.
31	,, 21.	Order amending the Ware Potatoes (No. 2) Order, 1951.
32	,, 13.	Order amending the Bread Order, 1951.
34	,, 14.	Order amending the Seed Potatoes Order, 1951.
209	Feb. 7.	Order amending the Flour Order, 1951.
211	,, 7.	Order amending the Chocolate, Sugar Confectionery, and Cocoa Products Order, 1951.
232	,, 10.	Order amending the Biscuits (Prices) Order, 1951.
261	,, 14.	Order amending the Eggs (Great Britain) Order, 1951, and the Eggs (Northern Ireland) Order, 1951.
271	,, 17.	Order amending the Butter Order, 1951.
279	,, 24.	Order amending the Bacon (Control and Prices) Order, 1950.
280	,, 17.	Order amending the Cheese Order, 1950. Revokes S.I. 1951, No. 2232.
282	,, 24.	Order amending the Sugar (Control and Maximum Prices) Order, 1947. Revokes S.I. 1951, No. 1547.
327	,, 24.	The Oils and Fats Order, 1952. Revokes S.I. 1949, No. 2291, and S.I. 1951, Nos. 21, 783, and 1251.
328	,, 24.	Order amending the Imported Canned Fish (Maximum Prices) Order, 1950. Revokes S.I. 1951, No. 1561.
329	,, 24.	Order amending the Imported Canned Fruit Order, 1950. Revokes S.I. 1951, No. 1400.
339	,, 24.	Order amending the Eggs (Great Britain) Order, 1951, and the Eggs (Northern Ireland) Order, 1951.
365	Mar. 1.	Order amending the Condensed Milk Order, 1951. Revokes S.I. 1951, No. 1722.
507	,, 16.	The Meat Products Order, 1952. Revokes S.I. 1948, No. 1509; S.I. 1949, Nos. 782, 1303, and 2045; S.I. 1950, No. 1764; and S.I. 1951, Nos. 314, 1029, and 1317.
527	,, 16.	Order amending the Bread Order, 1951. Revokes S.I. 1951, No. 592.
528	,, 16.	Order amending the Flour Order, 1951.
759	Apr. 15.	Order amending the Feedingstuffs (Prices) Order, 1951.
839	,, 30.	Order amending the Chocolate, Sugar Confectionery and Cocoa Products Order, 1951.
848	May 1.	Order amending the Milk (Control and Maximum Prices) (Great Britain) Order, 1951.
860	,, 6.	Order amending the Coffee Order, 1951.

No.	*Date.*	
	1952.	**CEREAL FILLERS**
568	Mar. 20.	Order amending the Cereal Fillers Order, 1951. Revokes S.I. 1951, No. 1656.
		EXPORTS
748	Apr. 15.	Order amending the Exports (Relaxation of Price Control) Order, 1946.
		FEEDINGSTUFFS
375	Feb. 29.	The Feedingstuffs (Manufacture) Order, 1952. Revokes S.I. 1950, No. 1988, and S.I. 1951, No. 1135.
		FLOUR
749	Apr. 15.	The Flour Order, 1952. Revokes S.I. 1951, Nos. 1042 and 2198; 1952, Nos. 209 and 528.
		FLOUR CONFECTIONERY
208	Feb. 7.	Order revoking the Flour Confectionery Order, 1951.
	1951.	**FOOD STANDARDS**
2240	Dec. 23.	The Food Standards (Edible Gelatine) (Commencement) Order, 1951.
	1952.	
2241	Mar. 7.	Order amending the Food Standards (Fish Paste) Order, 1951.
2242	,, 7.	Order amending the Food Standards (Meat Paste) Order, 1951.
		LABELLING
549	Mar. 31.	Order amending the Labelling of Food Order, 1950. Revokes S.I. 1951, No. 462.
		RATIONING
2243	Jan. 1.	Order amending the Feedingstuffs (Rationing) Order, 1949.
	1951.	
2266	Dec. 30.	Order amending the Bacon (Rationing) Order, 1951. Revokes S.I. 1951, No. 2007.
2267	,, 30.	Order amending the Rationing (Personal Points) Order, 1951. Revokes S.I. 1951, No. 1264.
	1952.	
109	Jan. 27.	Order amending the Bacon (Rationing) Order, 1951. Revokes S.I. 1951, No. 2266.
110	,, 27.	Order amending the Meat (Rationing) Order, 1951. Revokes S.I. 1951, Nos. 1921 and 2204.
548	Mar. 23.	Order amending the Bacon (Rationing) Order, 1951. Revokes S.I. 1952, No. 109.
728	Apr. 20.	Order amending the Fats, Cheese, and Tea (Rationing) Order, 1951.
		SOAP
210	Feb. 7.	Order revoking the Soap Order, 1950.

Co-ordination of Food and Agriculture

From time to time it has been proposed that, for the more efficient and economical performance of functions of Government—many of them now presumed to be permanent—within the realm of food production, distribution, and consumption, the Departments directly responsible should be amalgamated into a single Ministry. The idea may well have acquired some added weight from the combination of these concerns, at United Nations level, in the Food and Agriculture Organisation; although here a basic difference should be noted, in that the FAO has no operative functions, being limited to the collection, study, and distribution of data, the promotion of research, and the provision of technical advice and assistance to member Governments.

THE proposal for amalgamation has been met by considerable opposition, particularly from the retail food trade, while it has failed to win outright support from the principal organisations of farmers. On the political side, it may be recalled that a provisional arrangement was foreshadowed in a Conservative Party statement of policy issued in July, 1949. "There has been," it said, "a serious lack of co-ordination between the Ministry of Agriculture and the Ministry of Food. The Ministers in charge of the Government Departments most concerned with food production, imports, and nutrition must pursue in common a steady and effective policy."

The "co-ordination" thus regarded as necessary was seen to have been provided for when the composition of the new Cabinet was announced by the Prime Minister; it is the special responsibility entrusted to a member of the Cabinet holding what is ordinarily regarded as the "sinecure" office of Lord President of the Council. While, therefore, each of the Departments concerned has, as before, its own Minister, they share a common representation in the supreme policy-making organ of Government.

The departmental Ministers will speak for their Departments in the House of Commons, but the co-ordinating Minister is a member of the House of Lords, distinguished among other things for his tenure of the office of Minister of Food during the greater part of the war.

Departmental Functions

In view of the new arrangement, and possible developments therefrom in administration or action, it is worth while to outline the functions and operations of the Departments concerned.

First it should be recalled that the Ministry of Food, by reason of its immense trading activities and its continued responsibility for rationing, is much larger in terms of manpower, though much younger in years, than the Agricultural Departments. The Ministry of Food dates only from 1939 (though it had a predecessor in the first world war), whereas the history of the Ministry of Agriculture and Fisheries can be traced back in direct line well into the nineteenth century.

Agriculture and Fisheries

For agriculture, however, it is necessary to speak in the plural, for the Ministry deals only with agriculture and fisheries within the borders of England and Wales; for the northern part of the Kingdom there is the Department of Agriculture for Scotland, within the responsibility of the Secretary of State for Scotland, while Government responsibilities in respect of fishing, in that part of the Kingdom, fall within the ambit of the Scottish Home Department. In Ulster the corresponding affairs are dealt with within the structure of the Northern Ireland Government.

As to magnitudes judged by manpower, on the latest available figures the Ministry of Food has a staff of about 27,000, while the two Agricultural Departments for Great Britain number together about 18,000 people, rather less than half of them comprising the staffs of the County Agricultural Executive Committees.

When the first post-war Government announced, in November, 1945, its long-term food policy, the concerns of the Ministry of Food—thenceforth to be regarded as a permanent Department of State—were defined as comprising the "procurement, distribution, and price" of major foodstuffs in fulfilment of the responsibility, then accepted by Government, for providing at reasonable cost the supplies of the main foods required to maintain an adequate standard of nutrition.

Broadly speaking, the responsibilities of the Ministry of Food are parallel with the use of foodstuffs, whether produced at home or abroad, while the task of the Agricultural Departments has been to maximise home production thereof and to influence the composition of the total output in accordance with national policy.

A recent official document describes the activities of the Agricultural Departments as including the development of agriculture and fisheries; the support of agricultural education and research; the improvement of land and livestock; and due regard for conditions of employment of agricultural workers, to which should be added the interests of farmers and those providing capital for the industry.

By distinction, the Ministry of Food has to do with food supplies in general and their distribution, including the operation of the rationing system.

The Scope for Co-ordination

Clearly, some form of co-ordination between the Departments must always have been required, and hitherto it has been provided through various Cabinet committees and interdepartmental committees of officials.

The recently published history of the Ministry of Food* has recounted much of the detail of these changing relations and shows how, at times, they were not wholly successful in avoiding friction between the Departments, whatever degree of success may be claimed for the ultimate outcome.

Indeed, it would be surprising if the record were otherwise, since one Department is primarily concerned with serving the interests of consumers and the others with giving maximum encouragement to producers — two obligations which, at any rate in the short run, are not always easy to reconcile in practice with each other, or with an overriding national interest.

Food policy in the broadest sense, however, is or can be of interest to other Departments besides those directly concerned. This is so not merely because of a few, at first sight odd, appendages of the Ministry of Food—it was responsible, for instance, for soap rationing by reason of overlapping use of raw materials for the manufacture of soap and margarine, and had some part in the ultimate supply of commodities so inedible as paint and glue—but chiefly because of the bearing of policy in food and agriculture upon many other aspects of the nation's economic life.

The Role of the Treasury

Extending over all the varied Departmental interests, however, is the concern of the Treasury, not only in its capacity of controller of expenditure, but also as the Department specifically charged with responsibility for general economic policy. Thus, for example, the size of the food subsidies was, and remains, a matter of economic and monetary policy as well as of Exchequer finance.

Similarly, the magnitude and composition of the production programme for home agriculture has to be determined largely in the light of such considerations as the broad distribution of economic effort, in the long-run national interest, between various branches of activity and the state of the balance of external payments and receipts, whether in general or with particular parts of the world. Thus, for example, price variations for farm produce are found to have been a frequently used instrument for steering the composition of current agricultural output.

At the other end of the scale, retail prices, especially for subsidised foods, have sometimes been altered with particular regard for the effects thereof on the official index number.

A further use to which primary price variations have been put was exemplified in the annual price review in February, 1951, when, to overcome the seasonal glut of milk and eggs in the spring and early summer, the Government sought, "by widening the difference in seasonal prices, to discourage excessive production at these times and to stimulate production at the times of the year when there is still a shortage." In short, economic policy, currency policy, Commonwealth and foreign relations, all have some weight in shaping the activities of the Food and Agricultural Departments.

Farm Price Reviews

The interlocking of responsibilities is well illustrated by the arrangements under which the schedule of prices for home-produced farm products is periodically revised.

The procedure of these reviews, which are intended to look forward over a period of years, has been described in a recent White Paper. First, the quantitative objectives of future agricultural production are drawn up by officials of the Agricultural Departments in collaboration with the Ministry of Food, the Treasury, and central economic organs, in the light of broad economic and financial considerations, relative costs of home and imported supplies, the capacity of the industry and long-term requirements of good husbandry, and the interests of those engaged in farming.

The programme having been approved in general terms by Ministers, the Agricultural Departments enter into discussion with the farmers' unions, maintaining close touch throughout with the Ministry of Food and other Departments concerned.

The outcome of these complicated and often long consultations is the announcement by the Agricultural Departments of the prices to be paid in the period appropriate to the various types of product, in particular the annual crops on the one hand and livestock and livestock products on the other.

Finances of the Departments

The difference in functions between the Departments becomes apparent, again, on a scrutiny of the respective estimates of expenditure presented for Parliamentary approval. The general vote for the Ministry of Agriculture and Fisheries for 1951-52 amounted to a net sum of about £20 m., covering, among other things, agricultural education, training, research and advice, land settlement, drainage and development, improvement of livestock, and many other services.

In addition, the vote in respect of food production services amounted to £23 m., including substantial sums for subsidy payments (the largest being the contribution towards cost of lime) and the cost of trading services (such as the provision of pool labour and agricultural machinery and other activities of the County Agricultural Executive Committees).

The corresponding two votes for the Department of Agriculture for Scotland aggregated more than £8 m.

The figures for the Ministry of Food are vastly greater, the total (quite apart from special provision for strategic reserves) for 1951-52 amounting to nearly £405 m. Of this sum, £388 m. was under the subhead Trading Services (net), representing "mainly the difference between the selling price of commodities and their cost to the Ministry, including expenditure on distribution and other incidental expenses (among them, by the way, duties on imports of sugar, tea, and other dutiable

* *History of the Second World War. Food. Vol. I. The Growth of Policy.* See FOOD MANUFACTURE, **27**, 4, 155.

goods), the deficiency being incurred to keep down the cost to the consumer of basic foodstuffs."

The total includes the cost of the national milk and milk-in-schools schemes.

Benefits of Subsidies

It would be quite wrong, however, to draw from these figures any inferences as to the relative extent to which the consumer and the home farmer respectively benefit from the subsidies on food and agriculture. For one thing, allowance would have to be made for the fact that probably about two-fifths of the trading losses of the Ministry of Food are incurred in respect of imported food.

The subsidies administered by the Ministry of Food fall into two categories — those, making up much the larger part of the total, arising from the policy of selling at a loss to keep down the cost to the consumer of basic foodstuffs, and those which are defined as the "primarily nutritional" subsidies on welfare foods.

Thus, as regards the larger part of the subsidies, payments to processors, manufacturers, and distributors are not—according to an official description—properly to be treated as subsidies to the recipients, but as "refunds due to them as a result of the Ministry's selling price policy."

More fundamental, however, is the fact that, while the selling prices of the Ministry of Food are fixed with first regard for the interest of the consumer (subject to over-riding questions of financial policy), its buying prices for home produce are fixed to accord with national objectives of production.

There is, therefore, an inextricable mixture of interests which makes it impossible to compute how much of the expenditure of the Departments goes to the separate benefit of the farmer as such and how much to the benefit of the consumer; much, if not most, of it benefits both at the same time, and only a few items could with any show of reality be apportioned on one side or the other. This conclusion again emphasises the inseparability of the activities of the Food and Agricultural Departments.

The amounts of the votes just quoted do not correspond, without a good deal of adjustment, to the "ceiling" of food subsidies which has been set, with a downward trend, by Chancellors of the Exchequer in the budgets of the past few years.

As a first modification, the expenditure of the Departments on such items as research, advisory services, and general administration are not reckoned as being within the subsidy element. Secondly, it has to be remembered that the figures of Parliamentary votes represent cash provisions for the year, whereas the "ceiling" of food subsidies is set in relation to the Ministry of Food's trading accounts, worked, in accordance with commercial practice, on an income-and-expenditure basis. Finally, to arrive at the total subsidies to be subjected to the "ceiling," various items have to be picked out from the detailed accounts of the Departments.

M.o.F. Trading Accounts

Happily, the Ministry of Food produces highly informative trading accounts and reconciliation statements, the latest set of which was published towards the end of last year. Here it is plainly shown that for 1950-51 the total cost of food subsidies amounted to just over £400 m., or £10 m. below the original estimate—the same "ceiling" as for the previous year.

The total is made up of £336 m. net of Ministry of Food trading subsidies, as recorded in the consolidated profit and loss account, a loss of £36 m. attributed to the welfare food schemes, £12 m. of crop acreage payments by the Agricultural Departments, £11 m. of subsidy on fertilisers, provided through the Board of Trade, and other small items.

It will be noticed that the net cost of trading services of the Agricultural Departments is excluded from the aggregate of food subsidies as officially defined. Looking back over the years, the highest annual expenditure on food subsidies was £484 m. in 1948-49.

In general terms the difference between the aggregate of food subsidies, say £400 m., and the aggregate votes of the Departments for 1950-51, say £460 m., has already been explained. It is a difference that arises not only from cash expenditure not attributable to subsidisation, but also from the difference of accounting basis. Thus the net cash requirements of the Ministry of Food's trading services, placed at £386 m. in the estimate for 1950-51 as compared with the figures just quoted from the trading accounts, in the official words "reflect changes in the level of stocks"—as also in the level of other current assets and liabilities which are subject to considerable fluctuation in course of trading.

It would, for example, be possible in a given year to curtail the cash provision for trading services, corresponding to the Parliamentary estimates, by the simple expedient of allowing stocks to run down—or indeed by turning over a section of the business into the hands of private traders. Similarly, the building up of stocks on grounds of trade policy (as distinct from strategic considerations, which affect a separate vote of the Ministry) might possibly be hampered at times by the necessity of keeping cash outlay within the sum authorised by Parliament.

Here again the reconciliation may be made by reference to the accounts of the Ministry of Food. Adding together the figures quoted above, for trading subsidies and welfare food, with minor items, the total subsidies administered by the Ministry in 1950-51 amounted to a net sum of £374 m.

The actual cash appropriation for these services, however, which fell far short of the estimate of £386 m., was only £281 m. The greater part of the difference of £93 m. between cash outlay and subsidies was accounted for by the running down of trading stocks, which, valued at cost, showed a decline of £61 m. over the year to £221 m.

For the rest, there were balance sheet changes in other current assets and liabilities, while in the profit and loss accounts allowance is also made, on a national basis,

for services rendered to or by other Departments (such as the Ministry of Works for premises) without cash payment and for interest on "capital" provided by the Exchequer for the Ministry's trading operations.

Without the detailed trading accounts of the Ministry and the data provided in the accompanying memoranda, all this would be very confusing; indeed, not a little concentration is necessary even now to appreciate the precise meaning of various figures quoted from time to time, especially if they are used without exact definition.

Moreover, it is possible to imagine circumstances in which the combination of cash accounting, as required for Parliamentary purposes, and income-and-expenditure accounting as used throughout industry and trade might impede successful conduct of the Ministry's operations.

A few years ago an advisory committee,* set up by the Chancellor of the Exchequer, recommended clarification of the system on a permanent basis by the establishment of a Food Trading Fund, operating with capital provided by the Exchequer outside the ordinary cash estimates submitted annually to Parliament, but with provision in the cash estimates for the amount of annual food subsidy. Official statements indicated that the proposal was still under consideration by the late Government when it vacated office.

Magnitude of the Task

These matters of finance have been outlined partly because they illustrate the magnitude and complexity of the operations conducted by the Departments concerned in the provision and distribution of food and ancillary commodities such as fertilisers, feedingstuffs, and linseed. To mention a few more figures, the total sales of the Ministry of Food in 1950-51 amounted to nearly £1,400 m., and its trading operations are conducted through a score of commodity divisions, ranging from animal feedingstuffs to starch, for which separate trading and profit and loss accounts are published. In that year it was responsible, directly or through agents operating on its account, for buying abroad roughly £850 m.-worth of goods —all but a small part of the total of food and feedingstuffs imported.

The Agricultural Departments, together with the corresponding Department in Northern Ireland, are primarily responsible for negotiating the prices to be paid for the vast bulk of agricultural products sold off farms in the United Kingdom, of which the Ministry of Food in 1950-51 was the buyer to the extent of well over £500 m.

Agricultural Trading

As for the trading services of the Agricultural Departments, the accounts of the English county committees, the latest of which are for 1949-50, cover various activities—pool labour and hostels, agricultural machinery services, land drainage operations, pest destruction, lands farmed by committees, and so on—and these recorded an aggregate turnover, measured by outgoings, of £26 m.; the combined profit and loss account showed a deficit of £8¾ m.; and the balance sheet total came to more than £12 m., made up, on the assets side, chiefly of land, buildings and improvements, machinery, vehicles and plant, stocks and work in progress, and debtors.

The corresponding services for Scotland resulted in a deficit of just over £¾ m. on the combined profit and loss account, and the balance sheet total come to roughly £1 m.

Scope for Adaptation Needed

All this indicates the vast scope of the task of co-ordination between the Departments for Food and Agriculture—a task in the performance of which there must always be scope for adaptation, if only by reason of changes in current policy. Whether any economies or more efficient working could be obtained by amalgamation must be treated as an altogether separate question of administration. To answer it would require close knowledge of the inner workings of the Departments, their inter-relations and connexions with other parts of the Governmental system and their dealings with outside bodies.

Differences of Approach

Behind all this, allowance would have to be made for the differences of approach inherent in the respective functions—differences sometimes wrongly described as in the nature of "representation." It is not easy to see just how a unified Department, answered for in Parliament by a single Minister, could be made responsible at one and the same time for safeguarding, in both the short and the long run, the interests of fifty million food consumers (including farmers, their families and employees) and the stability and development of British agriculture, with its one-and-a-quarter million farmers and farm workers.

Charges of "feather-bedding" can perhaps be made with equal force both ways, and the holding of an equitable and equable balance may perhaps be more readily achieved by co-ordination between separate Departments headed by their own Ministers than by the decisions of a single Minister subject to the overriding direction of the Cabinet.

Midland Bank Review, February, 1952.

* Committee on the Form of Government Accounts, Cmd. 7969, 1950.

FUTURE ARTICLES

ARTICLES to be published in forthcoming issues of FOOD MANUFACTURE will include an illustrated description of a British food factory; the second part of Dr. F. Aylward's article on "Lecithin in Food Processing"; and "The Chemistry and Physics of Macaroni Products," by J. A. Radley.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of articles on the subjects covered. Books on food would also be considered.

The U.S. Canning Industry from 1940 to 1950

Part III

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Cremogenised Corn

IN 1947 occurred the commercial introduction of a new type of cream style corn, known as Cremogenised Corn.

The old type cream style canned corn, as defined by the United States Production and Marketing Administration, is "canned sweet corn prepared from corn removed from the cob by shallow cutting through the grain and subsequent scraping, causing it to have a creamy consistency." Ball[26] describes Cremogenised Corn as being "made from kernels which are cut from the cob in the manner followed by packers of whole kernel corn.

"The cut kernels are silked, screened, and thoroughly washed and inspected to ensure the absence of silk, husk, cob tissues, and other foreign substances. A portion of the thoroughly cleansed corn is treated mechanically to reduce it to a creamy semi-liquid, containing all the components of the kernels. Finally, the creamy semi-liquid is blended in established proportions with whole kernels, sugar, salt, and water to form Cremogenised Corn, which is then cooked, packaged, and sterilised."

Advantages of the Process

Foremost among the several advantages of Cremogenised Corn is that it is cream style corn in which the standard of cleaning the raw material is as high as that of whole kernel corn. Of almost equal importance is the advantage that the method followed in preparing this product permits the application of the Strata-Cook method of sterilisation, previously described in this report.

Other advantages are (1) all parts of the corn kernel are included in the product, including all of the pericarp, (2) cob particles, which impart undesirable flavour, are excluded, (3) kernels which are past the most tender stage may be used in making the cream component of the product with a resulting improvement in appearance and texture and a removal of the necessity of adding field corn starch to the product.

The equipment in a Cremogenised corn line includes all equipment of a whole kernel corn line up to, but not including, the filler, all equipment of the conventional cream style corn line starting with the brine tanks and the batch mixer, and including the blender, filler, closing machine, retorts and cooling canal, also a machine for comminuting the kernels to make the cream component of the product.

There were two semi-commercial operations on Strata-Cook Cremogenised Corn in 1949. Operations with that process on a commercial scale began in 1950 with excellent results. In 1951, there were four commercial and one semi-commercial operations, all using No. 10 cans.

Cremogenised corn packed commercially in 1947 amounted to approximately 250,000 cases, in 1948, approximately 500,000 cases, in 1949, one million cases, in 1950, two million cases, in 1951, more than three million cases are estimated.

The Cremogenising process is described in detail by Cover in U.S. Patents 2,484,375[27] and 2,484,376.[28]

Frozen Citrus Concentrate

One of the most dramatically successful new processes of all time in the canned foods field had its commercial introduction in 1948. This was the production of frozen concentrated citrus juice by a process which was the result of many years of effort by the Florida Citrus Commission to produce, for the commercial market, citrus juice which, upon reaching the consumer, would have organoleptic qualities closely resembling those of freshly extracted juice.

Expressed briefly, the purpose was accomplished through, first, extracting with the exclusion of bitter principle from the juice, second, concentrating by multiple stage evaporation at low temperature and pressure and in a very short time, and, third, withholding part of the juice from the evaporator and mixing it with concentrate to form the final product.

The process is described briefly[29] in these words: "The heart of the successful process is quick, high-vacuum low-temperature (50° to 70°) concentration of deaerated juice, followed by blending with unconcentrated juice, slush-freezing, canning, and hard-freezing quickly to 0°F."

Heat Balance System

In addition to the above-mentioned advantageous features of the juice concentration technique incorporated into this process, an extraordinary heat balance system was included in this step of the process, which is credited with accounting for an unusually low operating cost. Heid[30] comments on this system as follows: "In the Lake Wales process a three stage, single effect, falling film evaporator is operated without steam. Ammonia is compressed in a conventional refrigeration compressor. Latent heat liberated by the condensing ammonia is used to evaporate water from the juice, then vapour from the juice is condensed by evaporating the ammonia. Surplus heat of compression may be removed by warming incoming juice or dispelled in cooling water.

"An engineering advantage of this system is that the two pounds of ammonia which must be compressed to provide 1,058 B.Th.U. occupy a space of only 7·2 cubic feet at 45°F., instead of the 1,208

A 30 packet plunger filler in operation.
Photo Food Machinery and Chemical Corporation.

cubic feet occupied by one pound of water vapour at 60°F. Consequently, a small compressor may be used instead of a large one.

"The heat balance of the system has been described by Cross and Gemmill.[31] The initial unit was operated by a 300 h.p. direct connected 4 cylinder, 11 in. × 10 in. compressor. After four evaporators of this size were installed, two larger evaporators were ordered, which are operated by 700 h.p. compressors. This gives a production capacity of 1,000 gallons of 42° Brix frozen concentrate per hour."

Of interest in connexion with this development is a comment by Rector[32] that "it is probably true that but for the fact that cold water for condensing purposes is very scarce in Florida, this highly efficient piece of apparatus would not have been developed."

Retention of Fresh Flavour

In the development of the process, it was found that citrus juice, even when concentrated at a temperature below 80°F., acquires a flat flavour owing to loss of volatile constituents. For this reason, in order to retain fresh flavour in the concentrate, the procedure was adopted of concentrating a part of the juice to 60 per cent. total solids, then adding sufficient unconcentrated juice to form a final product having 42 per cent. of total solids. The unconcentrated juice provides the volatile components necessary to give a flavour to the reconstituted final product, which most tasters cannot distinguish from that of fresh juice.

This procedure was adopted after extensive experimental attempts to condense the volatile constituents removed during evaporation and restore them to the juice had resulted in failure because of the chemical instability of these volatile substances.

The blending step just described constitutes a modification of a procedure previously employed by Cruess,[33] who blended a concentrate obtained by freezing with a concentrate made by evaporation under vacuum to yield a flavour-rich syrup, far superior to that obtained by vacuum pan concentration alone.

Whether or not, under this blending procedure, low temperature evaporation produces better quality than evaporation at higher temperatures may be a moot question, as indicated by the following quotation from Rector.[32]

"Commercially satisfactory frozen concentrated orange juice has been produced in evaporating equipment with temperatures of the heating medium as high as 180°F. and liquid boiling temperatures as high as 110°F. Our skilled taste panels have not been sufficiently sensitive to prove clearly the superiority of the product evaporated at very low temperatures. In the Cross evaporator, however, these low temperature conditions are obtained with no increase in cost and since evaporation at low temperature is theoretically in the right direction, the industry has quite generally adopted the policy of going in the direction that good theoretical considerations lead."

Relative to advantages of frozen citrus concentrates, Rector[32] is quoted again:

"Competitors of frozen concentrate are primarily fresh fruit and canned juice. Compared with the fresh fruit, frozen concentrate is superior with respect to convenience. There is a convenience superiority 12 months in the year and, in addition, economy over fresh fruit about nine months in the year. Eventually, it is believed that there will be economy in using frozen concentrate 12 months in the year as well. Ultimately, sales promotion costs will be reduced and economies in freight and containers will come into full play.

"Compared with frozen single-strength juice, we have a convenience factor in frozen concentrate as well as superiority in flavour. Strange to say, the flavour in a 4 to 1 concentrate seems to stand up in zero temperatures better than does the flavour of frozen single-strength juice. There is an economic advantage of concentrate over single-strength juice also, inasmuch as with modern evaporating equipment, it is cheaper to evaporate water than to pay freight on it. There is, of course, a reduction of at least 50 per cent. in the container costs.

"As against canned juice the frozen concentrate enjoys no advantage in convenience. There is not much advantage in nutritive qualities, but there is very definitely an advantage in flavour. . . .

"One of the reasons a concen-

trate keeps better than single-strength juice is that it contains originally only 10 per cent. of the typical flowery aroma of fresh juice. The straight juice contains all of the aroma and, when this changes chemically, it is somewhat objectionable. The change goes on progressively, even at zero temperatures, but it goes on so slowly that for the first six months of storage it is difficult to detect any change. . . .

"Our experience is that juices concentrated by freezing and centrifuging are superior at the beginning, but lose flavour more rapidly than do the products made by the 'Florida Process.'"

As often happens upon the first attainment of a balance between supply and demand by a new product, a problem associated with storage of frozen orange concentrate arose during the past year. There have been several occurrences of deterioration owing to enzymic action. Doubtless, storage temperature is an influencing factor; however, trouble has been experienced during a comparatively short period of storage under ordinarily accepted commercial temperature conditions.

Inasmuch as it does not appear practicable to control this enzymic reaction through storage temperature alone, experimentation is underway to determine whether or not pasteurisation before concentration is feasible for frozen orange concentrate.

The "Florida Process" is covered by U.S. Patent 2,453,109,[34] dedicated to the public by the Florida Citrus Commission.

Pressurised Whipped Cream Product

During the 1930's, packing of whipping cream with a soluble gas (usually nitrous oxide) under pressure was begun with the use of returnable steel containers. The cream, saturated with the soluble gas under pressure, becomes whipped cream upon being discharged from the container through a valve and nozzle.

A typical procedure for packing this product is to put 7 ounces of 35 per cent. cream, seasoned with vanilla extract and sugar, into the container, vacuumise the container, and dissipate the vacuum with nitrous oxide, which is forced into the container until the desired pressure is reached, and then seal the container.

The cream occupies about half the volume of the container; the remaining space is occupied by the gas, which, at the time the container is sealed, usually has a pressure of about 120 p.s.i.g., which decreases to about 75 p.s.i.g. as the cream absorbs gas. Since the overrun in dispensing is about 300 per cent., each container delivers approximately one quart of whipped cream.

The first commercial distribution of this product came in about 1935. By 1940, there was much interest in the possibility of using single trip containers, but before any manufacturer could produce a can which it regarded as sufficiently strong, war restrictions on materials, including solder, practically dissipated all hope of being able to make a satisfactory can.

After Pearl Harbour, rapidly expanding restrictions soon ruled out the possibility of using tinplate for this product; so it was not until 1948 that the commercial use of single trip metal containers for gas-packed whipping products really took hold. Graham[35] estimated the 1949 production of this product at about 30 million units. Products so packed are, for the most part, formulated products and not pure cream. They usually consist of cream, sugar, stabiliser, and flavouring.

Up to the present time, drawn steel cans, without side seams, have been used almost exclusively. Manufacturers of cans with side seams still are doubtful if this type of can is strong enough to stand up under the pressure required for this product.

Any one of three types of machines may be used in the packing operation. These are (1) that in which the entire container is enclosed within a chamber, (2) that in which only the top of the container is enclosed during sealing, and (3) that in which vacuum is drawn and gas is admitted to the container through a valve permanently attached to the container. A procedure for sterilising the product has not been developed. The cream product is pasteurised only; therefore, requires refrigeration storage.

Graham[35] describes the single trip container as "an adaptation of a seamless drawn steel beer can coated on the interior with a sanitary coating plus a micro-crystalline paraffin type of wax. The exterior is lithographed in colour. The dispensing valve of rubber, stainless steel and/or plastic, is attached to a tinplate cap which is clinched with a suitable gasket to the top of the can."

Detailed descriptions of dispensers which are attachable to single trip containers are contained in patents by Kahn.[36, 37, 38] Containers primarily of the refillable type are described in other patents to Gotz[39, 40] and Marmorek.[41] Graham[35] also describes the packing procedure in detail and discusses public health and safety considerations involved.

The rate at which equilibrium pressures are established in the container may possess a use which has not yet been appreciated. When pressure equilibrium is established by agitation immediately after packing, the overrun of the product, which depends upon the amount of gas dissolved in the product, is a maximum in the first portion of the product withdrawn from the containers and a minimum in the last portion of the product withdrawn. By delaying the establishment of pressure equilibrium, it would probably be possible to obtain a uniform overrun in all of the product withdrawn from the container.

Stero-Vac Process

Not being restricted by rule to processes that have proved successful, we include in our enumeration the Stero-Vac Process, which had extensive use with citrus juices during the period 1938-1941 and a substantial commercial test with corn in 1940-1941; then faded from view.

The essential steps in the Stero-Vac process were (1) to put the food product into the container leaving a specified definite amount of headspace, (2) to close the container with a cover, in the centre of which was a valved opening, (3) to clamp the container tightly be-

tween two members of a processing machine, one of which members placed into communication with the valved opening in the end of the container a tube which could be connected to either a vacuum pump or a source of steam under pressure, (4) to produce vacuum within the container by withdrawing air through the valved opening in the top of the container, (5) to invert the container while it was still clamped securely between the two members of the processing machine, (6) to force steam under pressure through the valved opening into the food in the container, (7) to seal the valve in the end of the container, (8) to hold the container, while the food was at the high temperature produced by the steam entering the container, for a sufficient length of time to sterilise the food, and (9) to cool the container. A description of this process is found in U.S. Patents 1,732,227[12] and 1,938,821.[13]

Citrus juice packed by the Stero-Vac process was generally accepted as being as good as, but probably no better than, similar juice packed by the flash heating process. Therefore, after a few years of use, the process was discontinued. With low acid foods, corn and peas, an opportunity to judge the process in commercial use was not provided because extensive spoilage from understerilisation occurred throughout the period of commercial use of the process.

Modification of the Technique

During a period of non-use of the process, about 1945-46, a modification in the technique was introduced. The valved closure was eliminated and the container was held within a chamber under steam pressure while it was being treated. The food, consisting only of solid pieces, was put into the container after which the container, within a chamber, was vacuumised while the container cover was being held directly over the container in proper position to be applied to the container and separated from the container lip as slightly as possible without effecting a seal.

After being vacuumised, the container was immediately subjected to steam at processing temperature, which may have been between 260° and 280°F., and the jar and its cover were inverted while retaining the same relative positions with respect to each other. The container was then subjected to steam under pressure for approximately two minutes, during which time the steam entered the jar and heated the food to a temperature about 6° below the temperature of the steam outside the container. The container and cover were then rotated again into their normal position and the container was sealed with the cover. The container was cooled by means of a water spray. This method was a retrogression to a procedure, which was advanced by Fenn[11] in 1925.

While this modification improved the process mechanically, it did not remove the salient faults of the method and the process never was given a new lease of commercial life. One inherent fault was chiefly responsible for the failure of the Stero-Vac process. This was the wide variation in sterilisation heat treatment of the food in different individual containers and the absence in the technique of any provision to prevent this wide variation. If the heat treatment for low-acid products were so gauged as to ensure sterilisation of the food in every container, the food in some containers would be overcooked; moreover, the heat treatment would be so long that the cost of operation would be inordinately great.

Milk and HCF Process

In the development of the HCF process, a vast amount of work was done on evaporated milk. This work revealed a baffling problem on physical stability of high-short sterilised evaporated milk, which problem has for 15 years stood between this product and a commercial trial. More recently frozen concentrated milk has been receiving attention; many believe the technical and other problems in this process to have been practically solved and they believe that frozen concentrated milk will soon be on the market. Gemmill[15] gives a *résumé* on five technical and three economic questions to which conclusive answers may not yet be known. At least two of these questions pertain to physical stability which presents a problem when the milk is concentrated beyond a ratio of 2·5 to 1.

Both flash heating and controlled viscosity are instruments of known value in establishing physical stability in concentrated milk. Techniques for employing these instruments, described by Ball[16, 17, 18] and Mook[19] might be applied with benefit in the preparation of both frozen concentrated milk and sterilised concentrated milk.

Apparently destined to figure in the competition for consumer acceptance between frozen and high-short sterilised milk is a process developed by Roy R. Graves, with the use of which a programme of commercial canning of milk (not concentrated) for the Alaska market is reported to be in an organisation stage. In a personal communication to the writer, Graves describes the process as follows:

"Milk is drawn from cows on farms in a milking parlour, where cows can be properly prepared for milking and where the milk from each cow can be inspected for normalcy. The milk is produced without exposure to air, and is drawn from all the cows into a vacuum tank. On the completion of the herd milking, these tanks are moved by truck to the processing plant.

"In the processing plant the milk is moved under vacuum through a closed system, first through a homogeniser, then through a heat exchanger where the milk is heated very rapidly to sterilisation temperatures, then the milk is cooled rapidly and finally is aseptically canned and sealed and moves into cold storage."

Obviously, in this process, as in the Smith-Ball process, controlled sanitation plays a major role in keeping down the lethal requirements of the heat treatment by which the product is sterilised.

Another sterilising process was announced in trade journals in

1949[50] as "Dairy Dream Pure Cream," which was being canned commercially in 10 ounce and 46 ounce metal containers. This also is represented as a sterile product, and it is not reported to contain a stabilising substance such as "Avoset" contains. The sterilising technique is not disclosed.

High Frequency Sterilisation

Two processes which are occupying prominent places on the stage of current research should be mentioned, even though their commercial application appears destined for a prolonged delay.

The first is high-frequency sterilisation either through direct electronic effect without appreciable heating or through induction heating. A study of this type of sterilisation constitutes a major project under sponsorship of industrial concerns in the food field at the Massachusetts Institute of Technology. Other laboratories, including the R.C.A. Laboratory and Electronized Chemicals Corporation Laboratories, as well as large food packers, particularly Armour and Company, have been engaged in experimental work on high-frequency sterilisation.

The other process belongs essentially in the category of processes involving the use of chemical preservatives. The particular phase of this processing technique which has attracted much interest in recent months is that in which the preservative agent is an antibiotic, combined with mild heat. Results of an investigation, which was chiefly responsible for the attention the method is currently receiving, is described by Anderson and Michener.[51] Appraisals of the prospects for commercial use of the method have been published by Morse[52] and Cameron.[53]

Fruit Juices by Trituration

A comparatively simple technical development, not in food sterilisation, has recently been made experimentally by the author in the preparation of juices from high acid or medium acid foods. A new technique in treating the raw material results in improved physical stability of juices containing fibrous and other insoluble portions of the raw material.

The stability is produced by effecting a specific type of comminution of the fibrous solids while these solids are in a concentrated state—comminution of the type which is effected by a colloid mill having a conical star gear type of rotor and a grooved stator, each with cutting edges on its periphery.

This comminution, which shreds the fibres into threads of filament thickness also frees the soluble pectinous components of the raw material in such a way as to produce a thickening of the comminuted material. The latter material is mixed with juice containing very little insoluble solids, which has previously been extracted from the raw material, to form the final product containing the desired quantity of insoluble solids.

The juice thus formulated possesses better suspensive properties than juice produced by customary methods so that settling of the insoluble solids in undisturbed juice is greatly delayed. The procedure is particularly beneficial with pineapple juice.

An additional advantage of this juice preparation technique lies in its ability to convert products like tomatoes into juice containing the seeds or both the seeds and skin in finely comminuted state, thus conserving the nutritive values contributed by these components.

Loading a Busse loose bottom retort crate. The lever at operator's left operates hydraulic pumping unit.
Photo Busse Bros., and Columbia Canning Co.

The merits of this method of producing juice have yet to be proved commercially, although the process appears to be ready for commercial use.

Another recently developed canning activity which should be mentioned among "Products and Techniques" is the canning of carbonated soft beverages. Three pilot operations on a semi-commercial scale were conducted in 1949 in producing and marketing Pepsi-Cola, a well-known product of this kind.

Departing from the field of specific products and processes, we shall make a brief survey of items of equipment designed for use with no product in particular, which were brought into commercial use during the last decade.

Hydromatic Crate Loader and Unloader

The problem of bringing cans of food into orderly array for casing, following processes in which the cans have been handled in disorderly array, is a bothersome one. This problem is solved rather neatly by the Hydromatic crate loader and unloader, in which is combined a Hydromatic elevator with a retort crate having a removable bottom. A published description[54] of the device is as follows:

"A loading table with sheet steel top, capable of holding about 100 containers, is placed at the end of the canning line. The containers are conveyed on to this table from the closing machine.

Built into the floor at the end of the table is a Hydromatic lift, having a circular platform slightly smaller in diameter than the diameter of the removable bottom of a crate.

"As the cans or jars accumulate on the loading table, an empty crate is placed against the end of the table over the Hydromatic lift. The lift raises the bottom of the crate until it is just slightly lower than the table and not quite as high as the upper edge of the crate.

"Containers are made to slide by being pushed from the loading table on to the crate bottom until the bottom is filled. Then the crate bottom, holding the layer of containers, is lowered until a perforated sheet steel separator, which is placed on top of the layer of containers, has assumed the position which was previously occupied by the crate bottom. A layer of containers is then slid on to the separator sheet and the cycle of operations is repeated until the crate is filled.

"For unloading, a filled crate is placed over a Hydromatic lift at the end of an unloading table. The lift, acting upon the removable crate bottom, raises the load of containers until the separator sheet beneath the top layer is just slightly higher than the unloading table.

"The layer of containers is encircled by a strap which is operated upon by a hydraulic device to strip the layer of containers off the separator sheet on to the unloading table. The top of the unloading table is a chain conveyor which moves the containers into a single filing device, from which the containers are conveyed to a labeller or to a case packer. As in loading, the cycle of unloading operations is repeated with each successive layer of containers.

"The manufacturer of this equipment states that No. 2 cans can be loaded by one operator at a rate of 300 per minute and unloaded by two operators at a rate of 400 per minute. He claims also that No. 303 jar can be loaded by one operator at a rate of 150 per minute and unloaded by one operator at the same rate."

The containers are not roughly handled and always remain in upright position. The system has been in use for several years.

High Speed Fillers

A phenomenal increase in rate of filling containers has been accomplished in recent years. For strained or chopped foods (baby foods), for example, a filler is now in use having an operation speed of 400 202-214 cans per minute, and is so designed as to be free from action tending to incorporate air into the food and free from spots which might harbour spoilage bacteria. For products of particulate type, such as peas and whole kernel corn, fillers are now in use having recommended operating speed of 300 No. 2 cans per minute.

With these fillers, it is possible to have a new chronological order of procedural steps when brine packed foods are being filled. By filling the brine ahead of the solids, the entrapment of air pockets in the product is practically avoided. This advantage is particularly important when the liquid in which the product is packed is more viscous than water.

Another recently introduced filler will fill syrup on to grape fruit sections, sauce or oil on to meat or fish products, etc, in small cans at a speed of 200 cans per minute. To avoid aeration of a liquid product such as juice during filling into cans up to No. 3 size, a recently perfected filler equipped with extension tubes is used. The tube projects down into the container to a point as close to the bottom as practicable and is curved to direct the flow of liquid against the sides of the container. This filler, for cans up to No. 3 size, has a maximum capacity of 125 cans per minute.

Steaming Device

The period since 1940 has marked the beginning and the rapid growth of high-speed steam flow closure of metal containers, although low-speed operation of this type on both glass and metal containers, particularly the former, had experienced its commercial baptism years earlier. This method of closing containers, sometimes referred to as "Steam Vac" closure, was developed as a means of producing the necessary vacuum in liquid carried products without having to use exhaust boxes which occupy extensive plant space.

In this procedure, steam is injected into the headspace of the container during the time when the container lid is being positioned and sealed on to the container. If properly injected, the steam replaces practically all the air in the headspace of the container; thus, by sealing the container at the critical moment when the air has been displaced, a potential vacuum will be produced in the headspace, which will become real almost immediately after the container is sealed, when the steam in the headspace condenses.

The injection of steam is accomplished through specially designed steam ports around the seaming heads of the closing machine. Best results are obtained when a considerable volume of steam flows at a comparatively low velocity. Gauge pressure of steam behind the jets is usually about 10 pounds per square inch.

As indicated above, this method is best suited for liquid carried products, particularly those containing a full complement of brine or syrup. With syrup packed products, in steam flow closure, just as in mechanical vacuum closure, best results are obtained when the containers receive the syrup in a vacuum syruping unit, by means of which entrapment of air during filling is effectively prevented.

Pipe Blanching

Brief mention will be made of hydraulic pressure blanching because, although this operation received its baptism in industry in 1935, it enjoyed its greatest increase in popularity during the past decade, which brought it into widespread use in the blanching of peas, beans, and whole kernel corn. Hydraulic pressure blanching is accomplished by pumping water, with the food particles in suspension, through

tubing of 4 in. diameter. As a rule, approximately 80 per cent. of the mixture is water and the other 20 per cent. is the product.

The water is heated by steam in jackets which enclose a portion of the tubes and by steam injected into the water in the supply tank. The length of blanch is usually about two minutes. Advantages claimed for pipe blanching over old style blanching are (1) better sanitation, (2) greater flexibility, (3) greater uniformity of treatment, (4) space economy, (5) steam economy, (6) shorter blanching time because of pressure operation, and (7) cleaner product.

With corn, the primary use of the system oftentimes is conveyance rather than blanching.

Thermocouple for Heat Penetration

For many years, heat penetration tests in canned food have been made with the use of thermocouples attached to wire leads which extended from inside to outside of the retort through packing. The leads of the earlier types of thermocouples* were fixed in a stuffing box which had to be securely attached to the wall of the retort throughout the period of use of the thermocouples. With this arrangement of couples, a can was filled and sealed and a stuffing box for a thermocouple was attached to the can, usually by soldering. It was necessary to have the can near to the retort when the thermocouple was inserted into the can because the thermocouple lead was attached to the retort.

In 1923, the author, in the laboratories of American Can Company, introduced the use of a simple asbestos covering for the thermocouple leads, which permitted the leads to be placed between the retort cover and the gasket, thus making it unnecessary to attach the leads to the retort. When certain types of closing machines were available, it was possible to seal a can after a thermocouple of this type had been installed in the can. The advantage was gained, therefore, of being able to secure a thermocouple in place in an empty can, then fill and seal the can and take it to the retort for the heat penetration test.

This type of thermocouple also has now been largely outmoded and is seldom used. Because the rigid stem of such a thermocouple usually projects a considerable distance from the can, sealing the can containing a thermocouple is impossible in high speed closing machines. A connector type thermocouple, so-called because the lead wire is detachable from the thermocouple, was developed several years ago. A test can, containing a thermocouple of this type, can be sealed by high speed closing equipment. The lead wires, being detachable from the thermocouples, are usually joined into a cable and, with this cable, the packing gland for passing the lead wires through the retort body has come back into use.

Ecklund[55] describes the thermocouple as follows:

"The newest type of heat penetration thermocouple, in addition to having the connector feature, is so designed that the thermocouple and the receptacle which holds it do not project from the side of the can. This permits normal closure of the can on commercial closing equipment. The thermocouples are made in various lengths to fit various can diameters, or a long thermocouple, by use of a packing gland, may be used as an adjustable length thermocouple. However, when long thermocouples with packing glands are used, special care in filling and closing the container is necessary. . . . The essential units are:

"1. Thermocouples and receptacles for holding the thermocouples in the cans.

"2. Heat penetration cable consisting of lead wires fitted at one end with connectors for attaching to thermocouples, the other ends being attached to a selector switch. A packing gland is located in the middle of the cable to seal the wires through the retort wall.

"3. A potentiometer for indicating the temperatures obtained."

Tests have established the reliability of these thermocouples for accuracy.

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* It is of interest that the leads of the first thermocouples used by Bigelow and Bohart about 1916 were encased in lead tubing to give them flexibility and moistureproof protection. About 1918, the lead was replaced by rubber.

Sugar Development in India

In February this year, the foundation stone was laid for the new building of the Institute of Sugar Technology and Sugar Cane Research at Lucknow, the centre of the country's sugar industry, as an All India institution in the chain of national laboratories which the present Indian government is establishing.

The Institute will have a farm of 555 acres for crop research, while its adjoining laboratories will have every facility for the study of sugar chemistry, sugar engineering, and the utilisation of by-products. The laboratory and lecture rooms will be devoted to the training of technical staff. There will also be farm centres where work will be co-ordinated by the Institute.

Functions of the Institute

Among the functions of the Institute will be research in the attainment of higher yields from sugar cane and other aspects of technological efficiency, and the development of newer and cheaper sources of sugar production.

When laying the foundation stone, Mr. K. M. Munshi, Indian Food and Agriculture Minister, said that the sugar industry's production capacity was higher than the Planning Commission's annual target of 1,500,000 tons, which should be achieved by 1955-56. During the current year they would produce at least 1,200,000 tons as against 1,110,000 last year and 980,000 previously.

The sugar producing season in India lasts about four months and the only way to satisfy the demands of the industry for increased supplies of raw cane is to take over more of the land at present utilised in the growing of other crops. Raw cane is also required for the production of "gur," the major sweet carbohydrate used in rural India and made by a nationally important cottage industry, and "khandsari."

It is hoped that as a result of research, the percentage of extraction of sugar from cane will be increased. Intensive and not extensive cultivation is the policy of Mr. Munshi, who aims to use improved seed, appropriate manures, and plentiful irrigation to attain his aims.

Making Jagree or Gur.

Crushing the sugar cane.

Photos by courtesy of the High Commission of India.

In order to increase sugar production, Mr. Munshi feels that there is great scope for obtaining new and cheaper supplies of sugar from what is now called "waste," and by discovering methods of extracting molasses from wood residues, as for chips and sawdust, a subject at present being investigated by the Forest Product Laboratory of the United States. This latter source would provide a valuable cattle food, although the material is now mostly wasted.

The sugar cane industry is also being extended in the island of Mauritius where more than 150,000 acres of cane are now grown.

British Scientific Research

Grave concern at the delay in giving full effects to post-war plans, the realisation of which has been seriously hampered by difficulties in recruitment and building, is expressed by the Advisory Council of the Department of Scientific and Industrial Research, in their annual report for the period 1950-51, an abstract of which is given here.

THE task of D.S.I.R. at the present time is to ensure that research makes the greatest possible contribution to the carrying through of the rearmament programme and at the same time maintain national economy. Two matters of immediate importance to which attention is being devoted are the supply of raw materials and the raising of industrial productivity.

The report points out that "limitations on capital investment act as a brake on the exploitation of scientific advances, and foster those types of research which are likely to yield improvement without major capital outlay. Such work includes the better use of men and machines by the adoption of new and improved production engineering techniques and the study of human factors affecting industrial production."

An increasing number of D.S.I.R. Establishments and Research Associations are accordingly engaged in productivity surveys. A survey of research on the human factor in industry has been prepared jointly by D.S.I.R. and the Medical Research Council, and the best means for continuing and extending such work is under consideration.

Industrial Research

It is emphasised that "D.S.I.R.'s encouragement of co-operative research in industry is not based on the belief that the work of a Research Association is more valuable to its member firms than the work they themselves do in their own laboratories, or that it can be in any way a substitute for such work. On the contrary, the bulk of industrial research must continue to be carried out in the Research Departments of individual firms for their own purposes, and in fact the more a firm can do for itself the better it is placed to make use of the results of co-operative research. The increase in industrial efficiency that undoubtedly flows from the work of the Research Association brings great benefit to the general body of consumers, promotes export trade, and assists defence. These benefits are surely of such deep national concern as to justify the fullest support of the Research Asssociations from public funds."

The Advisory Council points out that the circumstances of industries, and their importance in the national economy, vary greatly, and many factors, scientific and technical as well as financial, need to be taken into account in assessing grants at different stages of the growth of a Research Association. Thus, in considering an application for grant the Industrial Grants Committee has before it information on the statistics of the industry, showing its constitution, the number of firms in it, and its production as distributed between firms of different sizes, the state of its trade, and its trend; particulars of its financial capacity and willingness to support co-operative research; and a statement of the importance of the industry in the national economy, and its place in the export trade and in relation to defence.

This information makes it possible to judge both the suitability of an industry for co-operative effort and the extent to which encouragement is justifiable in the national interest. The grant to be recommended is then assessed after consideration of the programme of research, its significance to the industry, its cost, and the scientific status of the Association.

The work carried out by the Food Research Organisation has covered the subjects of meat, fish, eggs, vegetables, and fruit, electronic and high frequency sterilisation, and basic research.

Improvement in the Quality of Meat

Meat research aimed at the improvement in the quality of frozen meat has continued at the Low Temperature Research Station and the Smithfield Laboratory. An important part of this work is the co-operative investigation being carried out in collaboration with the Commonwealth Scientific and Industrial Research Organisation, Australia, and the Scientific Adviser's Division, Ministry of Food, to evaluate certain defects in frozen beef and to discover means of mitigating them.

Frozen beef has, for instance, always been subject to adverse criticism because of "drip"—the red fluid which drains away on thawing. This drip not only represents a loss of nutrient and flavouring substances, but it is unsightly and makes handling unpleasant and awkward.

Results of work on the curing of bacon and ham and the bacteria associated therewith, which has been proceeding now for more than 20 years, have been assembled and reviewed. It is now established that whereas in a ham the bacteria are amenable to control by the traditional method of curing, the methods now used for bacon involving injection of brine into the interior are likely to introduce bacteria which can develop there and render the material perishable.

Off-flavours in Whalemeat

Animal products, especially those of a fatty nature, may develop off-flavours frequently described as "fishy." A number of such instances are under investigation. In flesh containing trimethylamine oxide, fishiness may be associated with reduction of trimethylamine by bacterial action. There is some evidence that this process may occur in whalemeat, which contains small amounts of trimethylamine oxide.

The main source of the off-flavour which develops in stored whalemeat, and which resembles rather the odour of cod liver oil, is caused by the oxidation of fat in the surface layers of the meat. It has been shown that unsaturated fatty esters, autoxidising in the presence of air and trimethylamine oxide, reduce the latter to trimethylamine. The definite association of trimethylamine with fishy flavours in whalemeat has, however, yet to be demonstrated. For periods of six months at least the defect can be prevented by protecting the surface of the frozen meat with an ice glaze.

In dried blood plasma also the production of fishiness is at least partly oxidative in nature, and here again the interaction of autoxidising fats with amino compounds seems to be involved.

Fish Research

Among other investigations, those on the freezing and cold storage of fish continue, priority being given to the development of suitable labour and space saving plant for freezing at sea. A small pilot plant freezing large slabs between movable vertical directly refrigerated plates has been designed and installed on board the research vessel *Keelby*. Tests at sea are in progress.

This plant quick freezes blocks up to 5 in. thick of cod or similar fish weighing up to one cwt. at an evaporating temperature of $-30°$ to $-35°$F. The fish are merely dropped or poured in, their weight providing sufficient contact with the metal. The frozen slab is released by warming with compressor gas.

If mechanical filleting at sea should become possible and blocks of fillets frozen, preliminary tests show that a very high freezing performance would be possible even at $-10°$ or 0°F. when cost, weight, space, and power consumption of condensing units would be considerably reduced.

In recent work on antioxidants, none of the substances tested (ascorbic acid, gallic acid, and ethyl gallate) has proved to be of much value in the storage of frozen herrings. Preliminary enquiries as to whether it is better to store frozen kippers or herrings show that a better product is obtained by freezing the latter when fresh, and that the quality of frozen kippers may depend much on the degree of curing.

Work on the chemistry of wood smoke has been continued. It has been found that phenols can be separated on paper chromatograms according to their hydroxyl content, and the individual components of these groups, *e.g.* di- or tri-hydric compounds, can be separated from one another. Using a paper partition chromatogram technique and employing special conditions for elution and a suitable colorimetric procedure, it has been possible to achieve estimations of microgram quantities of individual phenols in a mixture with an accuracy of the order of ± 5 per cent.

Storage of Eggs

In confirmation of results obtained in the laboratory, experience during the last two years of the storage of eggs on a large scale has shown that oiling, of itself, has no effect on the extent of wastage by bacteria and moulds during cold storage. Oiling has, however, a protective effect on the internal quality of the egg when it is brought out of cold store, *i.e.* during the marketing period, and this has been shown to be owing to the extra carbon dioxide retained within the egg.

Curiously enough, this effect is not evident during actual cold storage. During this period the main benefit conferred by oiling is a reduction in the rate of evaporation. During 1951 more than 130 million eggs were oiled and placed into cold store in the United Kingdom.

Fruit and Vegetables

Work has continued at the Ditton Laboratory on the chemistry of the constituents of fruits, on the storage of fruits and vegetables, and on problems concerning the attainment in stores of the most favourable conditions for particular products.

Investigations by chromatographic methods of the amino acids and carboxylic acids present in the apple have shown the presence of at least two amino acids and a carboxylic acid, the presence of which had not previously been demonstrated. The carboxylic acid may play an important role in respiration and attempts are being made to isolate it in quantity and to identify it.

Progress has been made in developing suitable methods for identifying and estimating the various compounds present in the wax of apples. Changes in the composition of the wax during storage are being observed with a view to ascertaining whether these changes are in any way related to the incidence of "scale," a physiological disease of serious economic importance. In this connexion the volatile products produced by apples during storage have been collected from a commercial gas store by absorption in solvents kept at $-80°$C. A number of esters and alcohols has been identified.

Potato Storage and Sprouting

A further season's work has been carried out on the storage of potatoes in permanent buildings, and it is now possible to advise on the height to which potatoes can be stored in piles in stores without forced ventilation, and the extent to which ventilation is necessary with increasing height of stacking. Although ventilation with cold night air does not allow sufficient cooling to prolong the storage period appreciably, storage in buildings does have substantial advantages in that it permits easier handling during the winter months.

Experiments on the effects of allowing volatile products of metabolism of potatoes to accumulate in the storage atmosphere indicate that there are substances other than carbon dioxide produced which cause a retardation of sprouting. The nature of these substances is being investigated, and the possibility of using them on a practical scale to delay sprouting is being considered.

In co-operation with the Ministry of Agriculture and the Ministry of Food, surveys have been continued into the deterioration of fruit and vegetables during dis-

tribution. Measurements have been made of the period elapsing between harvesting and the time when the fruit and vegetables reach the consumer, the temperatures to which they are exposed during this period, and the extent of deterioration. Information has been obtained about the deterioration of lettuce, cauliflower, plums, and strawberries. Special measures to reduce deterioration, such as the use of ice and high concentrations of carbon dioxide, are being considered.

Electronic Sterilisation

For some time interest has been directed to the possibility of using alternating electrical fields of high frequency to kill micro-organisms, since this offers a theoretical prospect of sterilising foods other than by heating them; recently it has been claimed that a highly lethal action results from interrupted application of the field. Experiments have been made both with an orthodox generator and with one specially built to produce a field interrupted in the manner specified. When stringent precautions were taken to eliminate the heat generated, there was no appreciable lethal action with fields of frequency of 20 Mc/s, whether interrupted or not. Work is proceeding on electronic sterilisation.

Basic Research

The work on the reaction between proteins and reducing sugars has been brought to a stage where it is possible to name the constituent amino acids which react with the sugar, and in so doing are lost to nutrition, and to delimit the conditions in which the reaction is most and least liable to occur.

Apart from attention to conditions of storage, especially as regards humidity, temperature, and *p*H, or removal of one of the reactants when present as a minor constituent, no means of controlling the reaction better than the use of sulphur dioxide can at present be suggested. In certain circumstances the reaction may be used to advantage in the modification or creation of flavour.

Pest Infestation

The work of the Pest Infestation Laboratory has continued to be concentrated particularly on the insect pests of stored foodstuffs.

Outstanding items of the Laboratory's work during the year are the treatment of grain in silo bins with carbon tetrachloride; fumigation of dried fruits in tins; the control of blowflies in slaughterhouses; and methyl bromide residues in wheat.

The Laboratory was asked to advise on a simple method of disinfesting the fruit in the tins at the time of packing. The problem was one of general interest, and the laboratory undertook to test two methods which appear to satisfy the requirements of ease and safety of application: (*a*) a large proportion of the air in the tin was replaced by carbon dioxide drawn as gas from a cylinder and introduced by means of a hollow spear thrust down to the bottom of the tin; and (*b*) a small measured dose of ethylene dichloride was introduced.

Complete control was given, under the conditions of these preliminary tests, by the mildest treatments, *i.e.* a dose of carbon dioxide (applied in 5 seconds), giving a mean concentration of between 20 and 25 per cent. by volume; or a dose of 1 ml. of ethylene dichloride per tin. The tests confirmed the practicability of both methods, although additional tests will be necessary to establish the minimum treatments under different conditions.

The full-scale experiment at a large slaughterhouse, begun in 1948 and involving the routine dusting with 5 per cent. DDT of refuse and nearby vegetation, and the application of improved measures for hygiene, has continued. Infestation by adult flies was kept at a very low level and breeding on the premises almost entirely prevented.

Fumigation of Wheat

Previous work at this Laboratory and elsewhere has shown that when methyl bromide is used for fumigating wheat, some of the fumigant combines chemically with the wheat, in particular with the protein constituents. During this reaction the bromine of the methyl bromide is liberated as water-soluble bromide. The increase in the water-soluble bromide content of the wheat, which is readily determined analytically, has thus been used as an index of the magnitude of the combined fumigant residue. Investigations are now in progress to determine how this fumigant residue, *i.e.* the methyl group of the methyl bromide, is combined with the various constituents of wheat.

Appended to the Report of the Advisory Council is a summary of work carried out during the year by the 14 Research Organisations under the Department's own control, and by 41 autonomous Research Associations in receipt of grants from D.S.I.R.

Among these is described the work carried out by the British Baking Industries Research Association which deals with such matters as the staling of bread; vitamin survey on commercial bread, cake, and biscuits; mineral oil in food; pasteurisation of egg; rancidity in cakes and biscuits; methods of heating in baking; use of plastic materials; and wafer biscuits.

At the British Food Manufacturing Industries Research Association at Leatherhead, research covered a wide field designed to meet the various sectional interests of the industry and included much long term work.

Work of the Research Association of British Flour-Millers has progressed on the subject of milling and baking qualities of home-grown wheat; nutritive properties of wheat; metallic impurities; structure of the wheat grain; flour improvers; and oats and oat products.

Our Contemporaries

Articles published in the associated journals of the Leonard Hill Group this month include the following:

"The S. Rhodesian Tobacco Industry," and a number of other articles on tobacco (*World Crops*).

"Automatic Control in the Process Industries," by Alan Pollard, B.Sc., A.R.I.C. (*Chemical and Process Engineering*).

Cereal Conference at Edinburgh

THE joint conference of the Food and Agriculture Groups with the Scottish Sections of the Society of Chemical Industry on "Quality in Cereals" held in Edinburgh was concerned principally with the cereals cultivated in Great Britain, *viz.*: wheat, barley, oats, and rye, together with their products, while maize and rice received only passing attention.

Six sessions were held, the first being presided over by Sir Harold Tempany (Chairman of the Agriculture Group of the Society) who, in a short opening address, reviewed the position of the cereal industries of the world and pointed out the critical influence of cereal production on world prosperity and peace, emphasising the pressing need for increased production of cereals in view of rapidly expanding world populations.

Among other papers was one on Cereal Agronomy by Mr. F. R. Horne, Director of the National Institute for Agricultural Botany, who said that the hybridisation of wheat had broken down some of the distinctions between national types, but that the type combining high milling and baking quality with higher yielding capacity in the field had not yet been produced. He mentioned also that first generation hybrid vigour which had given such remarkable results with maize was also in evidence to some extent in the case of other cereals, citing the example of hybrids between British and Scandinavian barleys which gave higher yields than either parent and had some claims to malting quality.

Speaking on the subject of the protection of cereal grains, Mr. G. V. B. Herford, Director of the Pest Infestation Laboratory of the D.S.I.R., emphasised the considerable losses at present suffered by cereals both in the field and in store after harvesting as a result of the attacks of insects and fungi; he discussed various methods for their control. Other papers at the same session included one by Dr. J. Duckworth, of the Rowatt Research Institute, on factors influencing cereals as food.

The afternoon session on the same day was presided over by Dr. D. P. Cuthbertson, Director of the Rowatt Research Institute. Papers were read by Mr. D. Cameron on the agronomic character of oat varieties, Dr. J. B. Hutchinson on the influence of agronomy on the processing of oats, and by Mr. K. D. Reid on the utilisation of cereal by-products.

The morning session on the following day was presided over by Dr. B. M. Brown, Controller of the Applied Division of Brewing Industry Research Foundation, and was devoted mainly to papers dealing with the malting industry. A striking paper was read by Miss A. M. Macleod on the testing of the viability of cereal seeds in which she described and discussed new rapid biochemical tests for viability now widely used by maltsters and grain merchants, which depend on the assumption that loss of activity of certain enzyme systems exactly coincides with ability to germinate.

At the same session Prof. J. A. Preece discussed the selection of barleys for malting, pointing out that while present laboratory methods could give valuable information about the malt obtainable from a particular sample of barley, they did little to indicate the quality of the work which the malt would provide. Mr. R. M. Thomson also read a paper on some malting methods.

At the afternoon session, discussion of malting methods was continued, Mr. R. J. Potter contributing a paper on the malting of cereals other than barley. He was followed by Prof. S. J. Watson, who discussed the utilisation of barley other than malting.

The concluding session was presided over by Prof. H. D. Kay (Chairman of the Food Group of the Society). The papers read included one by Mr. Einar Moininche on rye for malting, another by Mr. J. Gordon Hay on by-products of wheat, and one by Dr. J. Sword on biscuit flours. At the end of the conference Prof. Kay reviewed the work of the preceding days and expressed the view that the conference had served a very useful purpose, the papers having been very informative and the discussions full and illuminating.

During their stay, members of the conference visited the seed testing, plant breeding, and plant pathology stations at Corstorphine, whence they proceeded to Gleneagles.

Australian Fish

EVERY aspect of Australian fish and fisheries is dealt with in a comprehensive and attractively illustrated book* which has recently been published.

In Part I, the author describes the multitudinous kinds of fish that are to be found in Australian waters, how to catch them, the size they attain, their habits, and their respective edible qualities.

Fisheries and angling are the subjects covered in Part II in which the author presents a critical analysis showing on the one hand that there are not enough fish in Australian waters to satisfy the demand for fresh fish, that overfishing and unwise fishing have led to a serious decline in the fish population of the estuaries and trawling grounds, and on the other hand, that vast quantities of valuable fish suitable for canning are swimming unmolested awaiting commercial exploitation.

In this section the subjects of commercial fishing methods, freshwater fisheries, pond culture of edible fish, sharks and their products, big-game angling, trout in Australia, and underwater spear-gun fishing are dealt with.

The author recounts the vicissitudes suffered by the Australian canning industry before it reached its present flourishing state, and outlines the processing operations.

A notable authority on his subject, the author has presented his facts with a clarity and a sense of humour that make this book a fascinating source of information.

* *Fish and Fisheries of Australia*. By T. C. Roughley, B.Sc., F.R.Z.S. Pp. 343+xv. Angus and Robertson. Price 50s.

Lecithin in Food Processing

Part I

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Department of Food Technology, Borough Polytechnic

Until comparatively recent times the complex phosphorus-containing fats grouped together under the term lipins—which include the important group of lecithins—were of interest primarily to those concerned with human physiology and cellular metabolism. Some industrial applications were proposed at an early date but the extensive use of lecithin in the food and other industries is essentially a development of the past 20 years, following the production of lecithin as a by-product of soya bean processing. The earlier (and more expensive) commercial source was egg yolk. In view of the current shortages of fats, lecithin may find important applications in bakery products.

LECITHIN has been known for nearly a hundred years as a major constituent of egg yolk. An egg weighing 60 g. contains approximately 20 g. of yolk of which about 4 g. is neutral fat (tri-glyceride) and 2 g. lecithin and allied substances. Lecithin has been found associated with glycerides in all plants and animals and in micro-organisms, and appears to play an important part in the structure of living cells as well as in their physico-chemical and biochemical activities.

The tri-glycerides are soluble in acetone, in contrast to the phosphorus-containing fats which are insoluble in this solvent and which can therefore be prepared in the laboratory by treatment of the ethereal extract of a tissue with excess of acetone.

Lecithin may be regarded as a complex tri-glyceride in which one of the fatty acids has been replaced by a phosphoric acid and choline compound. The relationship may be summarised as follows:

Fatty Acid G—Fatty Acid Fatty Acid *Tri-glyceride*	Fatty Acid G—Fatty Acid OH group *Di-glyceride*
Fatty Acid G—Fatty Acid Phosphoric Acid *Phosphatidic Acid*	Fatty Acid G—Fatty Acid Phosphoric Acid —Choline *Lecithin or Phosphatidyl Choline*

The detailed structure of lecithin is given in Figure 1(a), which shows the four major components of the molecule, namely glycerol, fatty acids, phosphoric acid, and choline (hydroxy-ethyl tri-methyl ammonium hydroxide), all of which can be obtained under suitable conditions by acid hydrolysis. Lecithin is not to be regarded as the name of a single substance, but rather of a whole group of allied compounds, which may differ (i) in the nature of their fatty acids; (ii) in the site of attachment of the phosphoric acid to the glycerol framework (α or β); (iii) in optically active forms of the α compound, and (iv) in the structure of the phosphoryl choline moiety, which may be formulated as shown in Figure 1(a) or alternatively as a *Zwitter or dipolar ion* or as a betaine (internal salt).

Formula 1(b) is similar to 1(a), but emphasises different aspects of the molecule, in particular the presence of the di-glyceride portion which would be expected to be soluble in fat solvents and the phosphoryl-choline portion which would be expected to be water soluble and which, because of the dipolar ion, should be able to react under certain conditions as an ampholyte with either acids or bases. In the third formulation 1(c) the molecule is regarded as an organic derivative of orthophosphoric acid in which two of the hydroxyl groups are esterified.

All the different methods of formulation, although fundamentally the same, have their uses in the understanding of the properties and in particular the physical and physico-chemical properties of lecithin.

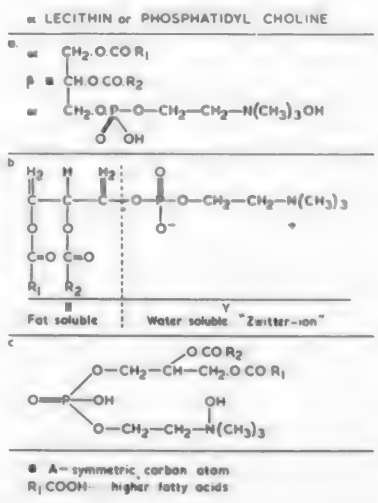

Fig. 1.

The Phosphatides

Associated with lecithin in soya bean, egg yolk, and plant and animal tissues are many allied substances (grouped with lecithin under the general term phosphatides) in which the choline is replaced by other nitrogenous bases or by amino acids. There may be present also other complex fats of somewhat different structures but all containing nitrogen and phosphorus. These, with the phosphatides, may be described as lipins (or phospho-lipids). The properties of the individual lipins are by no means identical with those of lecithin, thus the properties of a commercial lecithin will vary somewhat on its source and on the percentage of true lecithin present.

Chemical Properties

The chemical properties of lecithin are to some extent a reflection of the properties of the components of the molecule. Thus hydrolytic agents (acids, alkalis,

and enzymes) attack lecithin, and after varying periods of time yield either a mixture of glycerol, fatty acids, phosphoric acid, and choline, or alternatively intermediate products such as glycero-phosphoric acid or phosphoryl-choline.

The fatty acids present in lecithin from different sources have been examined in detail by the methods developed by Hilditch and others in their investigations on tri-glycerides, and a range of higher fatty acids, saturated and unsaturated, containing 16 or more carbon atoms have been isolated. Because of the presence of unsaturated acids, the lecithins can take part in addition reactions: (i) they can be hydrogenated by standard methods to give hydro-lecithins of various degrees of unsaturation; (ii) they readily absorb iodine and the iodine value can be determined in the usual way and used as an index of unsaturation; and (iii) they absorb oxygen.

Stability of Lecithins

Purified lecithins change rapidly when exposed to air, no doubt by a combination of oxidative and hydrolytic processes comparable to, but probably even more complicated than, those responsible for the onset of rancidity in ordinary fats. Iron salts and other reagents catalyse the oxidation processes.

These changes do not occur so rapidly with crude lecithin preparations, especially those from vegetable sources, because of the presence of natural antioxidants, which are associated with the phosphatides, and which play an important protective role in stabilising both the lecithins and the tri-glycerides.

Thus we have the paradoxical situation that in spite of the instability of pure lecithin, commercial lecithin can often be recommended for its antioxidant properties.

Lecithin does not give a true melting point but is decomposed by heat from 110°C. onwards; crude mixtures containing triglycerides may be more stable. Wet combustion methods (concentrated sulphuric acid and hydrogen peroxide) may be used to break down the molecule, as in the Kjeldahl method for the determination of nitrogen and the corresponding technique for the estimation of phosphorus. In pure lecithin the atomic ratio nitrogen/phosphorus is unity, but this is true also for certain other phosphatides; thus the ratio has only limited uses as a criterion of purity.

Physical Properties

Lecithin when freshly prepared is an almost colourless waxy solid, but on exposure to air it rapidly becomes dark brown in colour, following the absorption of oxygen. To obtain pure samples of lecithin, many precautions have to be taken at all stages and in particular low temperatures must be used and air and light excluded.

The typical organic solvents (ether, petroleum ether, chloroform, benzene, alcohol) dissolve lecithin to form either true or colloidal solutions, but, as already noted, ketones—especially acetone—do not dissolve phosphatides and in fact will precipitate them to a greater or lesser extent from ether solutions. The phosphatides are also insoluble in methyl acetate.

Investigations have shown that the solubility of lecithins in a solvent such as ether varies somewhat with the fatty acids present, the highly unsaturated lecithins being most soluble and the fully hydrogenated compounds least soluble. This relationship of physical properties with the degree of saturation is well known in other sections of fat chemistry and forms the basis of the separation of saturated and unsaturated fatty acids by the lead salt (or Twitchell) method.

Colloidal Properties

The behaviour of lecithin with water has been extensively studied, especially in relation to its surface-active properties. Different stages can be distinguished depending on the relative quantities of phosphatide and water present. Lecithin is hygroscopic and rapidly absorbs water vapour from the air. When a small amount of water is placed in contact with lecithin, the solid appears to bud, giving irregular outgrowths—the so-called myelin forms. In the presence of more water the imbibition process continues and the mass swells, until (if sufficient fluid is available) a colloidal solution results.

These and related phenomena have been studied by the usual technique of colloid chemistry, and it has been shown, for example, that lecithin, like fatty acids, will form molecular films on water. Lecithin will lower the surface tension of water and aqueous solutions, and will lower the interfacial tension between water and insoluble substances such as fats or benzene.

It was found at an early date that various neutral salts including cadmium chloride and magnesium chloride would precipitate lecithin from colloidal solutions, and salts are frequently used in combination with acetone to obtain complete precipitation. Pure acetone may precipitate only part of the phosphatide from a dilute ether solution; quantitative results may be obtained with an acetone-magnesium chloride mixture, a fact which is used in the determination of small amounts of phosphatide in tissue extracts. Investigations have shown that different anions and cations vary in their effectiveness as precipitating reagents and with certain exceptions the Hofmeister rule which applies to other colloids is followed.

Lecithin may form loose combinations with sodium chloride, the resulting product being soluble in ether and other fat solvents. Complexes of lecithin with sugars and proteins have also been examined and these—like the salt combinations—may be of importance in physiology, and may help to explain certain results obtained in connexion with the food uses of lecithin.

Emulsifying Powers

Lecithin is a hydrophilic colloid and, because of its effect in lowering the interfacial tension between water and other sub-

stances, serves as a wetting agent and will promote emulsions of the oil-in-water type.

A demonstration of the emulsifying power of lecithin may be obtained by using two stoppered 50 ml. measuring cylinders to each of which is added 5 ml. of olive oil (coloured by the red fat-soluble dyestuff Sudan III) and 20 ml. of water. To the second cylinder 1 ml. of an aqueous lecithin preparation is added. Both cylinders are then shaken and the coloured oil is dispersed throughout the water. On allowing to stand, the dispersion in the first cylinder settles out, with the layer of the red oil above the clear water phase; in the second cylinder a stable emulsion results, because of the presence of the lecithin.

It has already been pointed out [see Figure 1(b)] that the lecithin molecule, like that of other surface-active agents can be considered in terms of two portions, one potentially fat soluble, the other potentially water soluble. When lecithin acts as an emulsifying agent in an oil-water mixture, the molecule is orientated at the surface of the oil (see Figure 2) so that the fat soluble moiety (X) is directed onwards towards the oil, the water-soluble moiety (Y) outwards towards the water. This is the essential basis of the emulsifying role of lecithin which contributes to its successful use in certain food industries.

Lecithin will not only stabilise oil-water emulsions, but will also act as a protective colloid in delaying or preventing the precipitation by salts of hydrophobic colloids (*e.g.* metallic particles) dispersed in water. This observation forms the basis of some of the non-food uses of lecithin.

Physiological Properties

The physiological role of lecithin has been investigated over the past 50 years both by classical methods and by the more modern technique of "labelled molecules" using compounds in which isotopic forms of phosphorus have been incorporated into the phosphatide molecule.

It would appear that lecithin may have one of three distinct but allied functions in the animal body; it may be part of the actual structure of the living cell; it may play a part in cell membrane structure and permeability or in other physico-chemical processes; it may be actively concerned in the metabolism of fats. There is considerable evidence in favour of all these hypotheses, but whatever the exact function may be it is clear that lecithin is a naturally occurring substance of great importance, and that its use as a food adjunct can in no way be harmful.

Considered from the nutritional viewpoint, it can contribute to the body the same components as the tri-glycerides, namely glycerol and fatty acids; it contributes also phosphoric acid (important in mineral metabolism) and the base choline which has certain properties which entitle it to a place among the water-soluble vitamins.

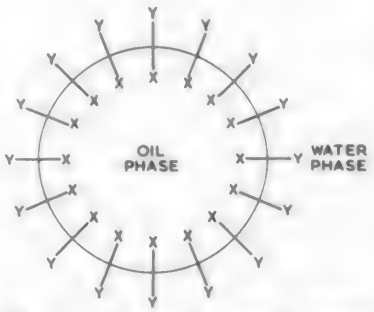

Fig. 2. Oil-in-water emulsion promoted by lecithin (X—Y) distributed at interface.

The nutritional role of lecithin can well be illustrated by reference to the egg of the hen or any other bird. The egg contains all the nutrients necessary for the initial growth of the embryo, and during the incubation process the lecithin of the yolk is utilised partly to supply energy for growth, and partly to supply materials required for the formation of body tissues. Thus phosphorus originally in the lecithin becomes part of the bone structure of the chicken.

Considered in terms of calories, the fatty acids of lecithin will on combustion make the same energy contribution to the body, as will the fatty acids from tri-glycerides or any other source. The total energy contribution of lecithin will be high, but somewhat lower than that of the tri-glycerides because of the presence of the phosphoric acid and choline.

Economic Aspects

At one time regarded almost as a chemical curiosity rarely mentioned in standard chemistry textbooks, lecithin during the past 20 or 30 years has attained a position of some importance, and its increased uses in industry following its greater availability, have led to a gradual decrease in its market price.

American statistics show a change from 75 cents per lb. in 1930 to 15 cents in 1950, and reveal also that 8,000,000 lb. of lecithin were produced in the United States in 1948, but that a further 40,000,000 lb., which could have been obtained from soya and other sources, were not recovered. It is clear, therefore, that in the United States there is a large potential reservoir of lecithin which can be manufactured in response to an increased demand.

In Germany, lecithin from rapeseed oil has been extensively used, and in Britain lecithin is being produced both from groundnut and soya oil. The amounts available at any time will be roughly proportional to the total quantities of oil extracted and will therefore fluctuate with the supplies of edible oils from these sources.

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(To be continued)

News from the Industry

FORTHCOMING EVENTS

Health Congress, 1953

The 1953 Health Congress of the Royal Sanitary Institute is to be held in Hastings from Tuesday, April 28, to Friday, May 1, inclusive.

Equipment for Table Poultry

Designed to illustrate the various husbandry and processing techniques which take place during the production of a table bird between the breeding pens and its arrival to the consumer was a demonstration held recently at the Herts. Institute of Agriculture, St. Albans.

The proceedings opened with exhibits of breeds and breed type, stressing the points of good table birds. The processes which are necessary before the birds are ready for table were discussed.

The latest developments in humane killing methods and varied examples of plucking machines were displayed. Both hand operated and mechanical machines were on view, as well as mobile air conditioning racks, shaping racks, and other equipment.

Pest Control Products

During the last 25 years great advances have been made in the development of chemicals for pest, weed, and rodent control. In the past 10 years in particular, many new compounds have been marketed on a world-wide scale for use in agriculture, industry, medicine, and veterinary practice. The chemical names of these compounds have been, in many instances, too complicated for common use, and shortened forms and trade names have been devised. As several of these may apply to the same chemical compound, confusion has arisen in commercial descriptions of products and also in the technical literature.

In an endeavour to reduce this confusion, a British Standard list of coined common names has been issued for established pest control products, embracing insecticides, insect repellents, acaricides, nematocides, fungicides, herbicides, and rodenticides. These names do not conflict with proprietary names, but are intended for common use to assist users in the identification of the active ingredients of pest control products having otherwise cumbersome technical names. It is emphasised that these names are in no way proprietary, but in order to pre-empt as far as possible their availability as common names they have been recorded, though not registered, as Trade Marks, by H.M. Patent Office.

Biological Consultants

The Institute of Biology has recently established a Register of Biological Consultants. Subjects covered by biologists on the register include agronomy, bacteriology, biochemistry, ecology, entomology, fisheries, forensic biology, histology, microbiology, nutrition, pest control, protozoology, river pollution, and wildlife conservation. The Institute is now in a position to recommend specialist advisers in any branch of the biological sciences to those requiring their services. Enquiries should be addressed to the General Secretary, Institute of Biology, Tavistock House South, Tavistock Square, London, W.C.1.

Standard Tins for Honey

At the suggestion of beekeepers and honey producers the British Standards Institution has prepared B.S. 1817, "Tins for Honey."

It is a document similar to B.S. 1777, "Honey Jars," and caters for the 4 lb. and 7 lb. tins used for retail distribution, the 14 lb. and 28 lb. sizes used both for distribution and as "feeders" or for other purposes within an apiary, as well as the 56 lb. tin used for storage and bulk distribution.

Careful consideration has been given to the specification of closures. The lever types of rings are generally regarded as the most suitable for the 4, 7, and 28 lb. size but each different type of lever has its own advantages and disadvantages from the packers' point of view. Trials have been carried out, however, which support the types of lever rings specified in the standard.

Cements for Flooring

A new furane resin group of cements are claimed to be the last word in resistance for flooring food factories. They are the latest addition to the special section of Semtex, now handling industrial floorings generally, and particularly those in the food and allied industries.

Where traffic and general usage are light, but where resistance is nevertheless important, the company offer their proprietary continuous flooring Fleximer. Where traffic is heavy, as from the trolleys often used in food processes, and where general conditions are rigorous, bricks and tiles are preferred. These are bedded in various types of resistant cements, the two outstanding types being those based on rubber latex and its synthetic counterparts and those based on this new furane group of resins.

The first group is slightly rubbery and elastic, a quality which overcomes the unequal expansion caused by spilling hot water on the floor which makes the floor covering break up; while a brick or tile floor built in the new group of furane resin cements is absolutely resistant to heat, fats, acids, and any concentration of alkali.

Gelatine for Ice Cream

An interesting leaflet has been recently issued by B. Young and Co., suppliers of Spa gelatine, in which are contained recipes for soft ice cream with vertical freezer, for speed freezer, for horizontal batch freezer, and for continuous freezer. There are also two recipes for iced lollies. Copies of the leaflet are available from the makers at Spa Works, Grange Road, London, S.E.1.

A New Start Motor

Production of the latest addition to the Small Electric Motors Capacitor start motor range is planned for the end of 1952. This is the 1½ h.p. motor at 1,420 r.p.m. and has been designed specifically for heavy duty drives such as refrigeration, air compressors, etc. Fitted with screen protection, it has an exceptionally good starting and accelerating torque.

Physically, the motor is interchangeable with its counterpart in the 3-phase high torque range. This is important for the manufacturer who wants standardisation on motor mountings.

Bottle Rationalisation

The purpose of a leaflet on bottle rationalisation, issued jointly by the Mineral Water Engineers' Association (affiliated to the Food Machinery Association) and the Brewery Equipment Section of F.M.A., is to draw attention to the manner in which departures from generally accepted standards in bottles for beers and soft drinks may interfere with the working of bottling machinery. It also emphasises the value of consulting the machinery manufacturer as well as the bottle supplier when contemplating changes in bottles.

Freezing and Drying

A report containing all the papers read at the Institute of Biology Symposium on Freezing and Drying which was held in London last year has been published. The whole of the discussions which followed the papers have also been included.

Resignations

Mr. W. J. Studholme, who has been associated with Lovell and Christmas for 36 years, has reached retiring age and tendered his resignation from the Board. He will be continuing his directorships of several of the Associated Companies in the Group.

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Mr. H. A. Pratt has retired from Van den Berghs and Jurgens after 43 years' service, spent chiefly as a representative in South London. At a recent farewell luncheon, Mr. G. E. Quinnell, general sales manager of the company, presented Mr. Pratt with a watch for which his colleagues had subscribed.

Adhesives and Abrasives

The new £250,000 factory of the Minnesota Mining and Manufacturing Co. at Gorseinon, near Swansea, was opened on May 24 by Mr. P. Thorneycroft, President of the Board of Trade.

The American company, composing the majority shareholders, was first formed in 1902 to exploit a corundum deposit at Lake Superior. The English company now manufactures a wide range of adhesives and abrasives, as well as sealing and recording tape. The Adhesives and Coatings Division is now in production at Gorseinon and products of the Adhesives Tapes Division will ultimately be manufactured there, including the Scotch Boy cellulose tape for packaging. Speaking at the opening ceremony, Mr. Thorneycroft said that he understood export orders for the products of the new factory had already been received.

Institute of Material Handling

It has now been decided to proceed with the formation of an Institute of Material Handling under the chairmanship of Mr. H. P. Mott (Vauxhall Motors) with Mr. John Bright (Joseph Lucas) as deputy chairman.

Membership of the Institute is to be confined to individuals and not to include firms or corporations, and persons engaged in material handling at all levels, provided they have the one common interest in furthering the technique of material handling, will be eligible.

Erections and Extensions

Construction work is now in hand for the building of a new packing factory for Shannon Meat, Ltd., on a site at Rathkeale, Co. Limerick.

*

Extensions to their works at Victoria Road, Dartford, Kent, are being planned by J. and E. Hall.

A new paper snack box, made by Mono Containers, comprises an unwaxed 8 oz. paper drinking cup and a separate compartment for sandwiches and other forms of light refreshment.

Presentation to Lord Boyd Orr

A specially bound copy of the book "Four Thousand Million Mouths" (reviewed in FOOD MANUFACTURE, 26, 12, 474) was presented to Lord Boyd Orr by Lord Haden-Guest on behalf of the contributors on May 29, in a room of the House of Lords.

Following the presentation of the book, Lord Boyd Orr said: The issue facing mankind today was whether the great new powers science had let loose would be applied to destructive ends in another world war or to constructive ends. We all hoped that wise counsels would prevail and that the nations would agree to co-operate to apply science to develop the vast potential wealth of the earth to put an end to hunger and poverty which afflicted the vast majority of mankind and were the main causes of the spread of communism.

The first task to be undertaken was the increase of the world food supply. Two out of three people in the world were inadequately fed and with the rapidly rising tide of population and the falling reservoir of food resources the position would get worse unless more vigorous action were taken on a world scale.

The United Kingdom, the centre of the British Commonwealth and Empire, which had already done so much for the welfare of the people under its beneficient rule should, in its own interest take the lead in promoting a world food plan.

This country imported about half the food it consumed and its position now was very different from what it had been in the second half of the nineteenth century. Then the opening up of the new continents provided it with an abundance of cheap food which could be paid for because it had almost a monopoly of the world markets for industrial products. The surplus coming on the world markets from the food exporting countries was shrinking. It was increasingly difficult to find a surplus to import and equally difficult to pay for it by exports against the competition of Japan, Germany, the United States, and other countries that were being rapidly industrialised.

The question of what the food position of this country might be 10 or 20 years hence was of more importance to the people than the nationalisation or denationalisation of steel or transport or even which party would win the next election.

Fifty Years of Manufacturing

Fifty years of manufacturing at Rugby were celebrated recently by a lunch in the BTH Works Canteen.

Mr. H. L. Satchell, M.B.E., Director, Manager BTH Rugby Works, presided over the assembly of 230 which included Mr. James Johnson, M.P. for Rugby, the Mayor and Town Clerk of Rugby, the Secretary of the Engineering and Allied Employers' Leicester and District Association, a number of Trade Union Officials, and some 200 employees of the British Thomson-Houston Company. Among these employees there were some with more than fifty years' service with the company, and a number with more than forty years'.

Visitors sample some of the cider at Long Ashton Research Station.
Photo Long Ashton Agricultural and Horticultural Research Station.

Cider Sampling at Long Ashton

Interest at the morning session of the Long Ashton Cider Sampling Day centred mainly round Sections II and III. The ciders in Section II were part of a larger series of 15 ciders comprising five pre-fermentation juice treatments and three yeast treatments (natural flora and two selected yeasts). The selected yeast ciders were on show in the afternoon.

The morning series Nos. 10-14 showed direct treatment effects and indirect effects owing to changes in the natural microbial flora. For example, the fresh juice contained seven distinct types of yeast and many bacteria, some capable of causing oiliness, a disorder which did not develop. No. 11, after treatment with sulphur dioxide, had only two main yeast types and no apiculate types, mycoderma, or oiliness bacteria.

In the view of some, No. 11 was the best of the series, while others preferred No. 13. The point of interest in No. 13 was that the flash pasteurisation had apparently inactivated the pectin esterase of the juice, as the final cider contained pectin and was rather more full bodied.

In Section III the main interest was in No. 19 where a controlled malo-lactic fermentation of a dry cider had been used to reduce the acidity from 1 per cent. to 0·5 per cent. The value of this type of bacterial fermentation is recognised in wine-making but, so far as is known, a pure culture fermentation with an organism of this type has not been used before in cider making.

In the afternoon, visits were made to the plantations.

The importance of forming the initial branches of standard or bush cider trees so as to prevent "crotch-splitting" in later years was demonstrated.

Comparisons of the development and cropping of dessert apples under different systems of planting were pointed out and demonstrations of possible varieties of gages and dessert plums for present-day planting, including Long Ashton raised dessert plums, were given.

Gelatine and Glue Research

Representatives of member firms, Research Associations, and Government Laboratories attended the fifth meeting of the Research Panel of the British Gelatine and Glue Research Association.

The first paper, given by Dr. J. T. Edsall, Professor of Biological Chemistry, Harvard University, Fulbright Visiting Lecturer at Cambridge University, was "The Conversion of Fibrinogen to Fibrin."

"The Effect of the Temperature of Preparation on the Mechanical Properties and Structure of Gelatine Films" was the title of the second paper by Mr. E. Bradbury of the British Cotton Industry Research Association.

Mr. R. A. G. Knight of the Forest Products Research Laboratory read the final paper which dealt with the development of the laboratory's work on the behaviour of plywood and glued joints.

Portable and Other Conveyors

Incorporating a patented inverse drive, which enables the continuous track to operate both booms with freedom of travel while permitting the booms to operate independently, the Junior hinged boom conveyor, manufactured by Fourways (Engineers), is available in two sizes and may be electric or petrol driven. A portable model of this conveyor is also available.

Another hinged boom portable conveyor, supplied by the company, possesses a reversible track and can be operated and moved by one man. The whole of the operating mechanism and controls are located within the frame and easy access is obtainable by means of a sliding panel.

The new Fourways portable lightweight conveyor has a constant loading position which enables goods to be loaded from ground level as well as from any form of transport. This conveyor, which is very suitable for transport loading and limited stacking, is easy to handle and is available in two sizes.

Stainless Steel Valves

The processes and technical data of the Cooper Alloy Foundry Co., of Hillside, New Jersey, U.S.A., are to be used by The A.P.V. Company for the manufacture of stainless steel valves.

The Cooper firm, who have obtained a Mutual Security Agency guaranty of currency convertibility covering royalty payments by A.P.V. for use of its processes, are leading producers of stainless steel, nickel, and monel valves for the processing and manufacturing fields. They will furnish designs, engineering, and production drawings, as well as information on techniques and procedures for the manufacture and use of valves used in the processing of chemicals, brines, petroleum, explosives, paper, and other products involving corrosive and hazardous liquids and gases.

The American firm agreed to make this technical data available to A.P.V. under a 10-year licensing agreement, with royalties to be paid for all valves produced with Cooper processes and sold or used by A.P.V. during the period.

The U.S. Government has agreed to convert into dollars any sterling royalty payments which the American firm is unable to convert through regular foreign exchange channels, up to a maximum of $153,500 over the 10-year period.

U.K. sales of stainless steel valves are expected to reach a volume of from £100,000 to £150,000, with exports yielding the U.K. valuable hard currency through the company's extensive overseas organisation.

A Seventy-fifth Birthday

The seventy-fifth anniversary of the foundation of their company has this year been celebrated by Tieleman and Dros of Leiden.

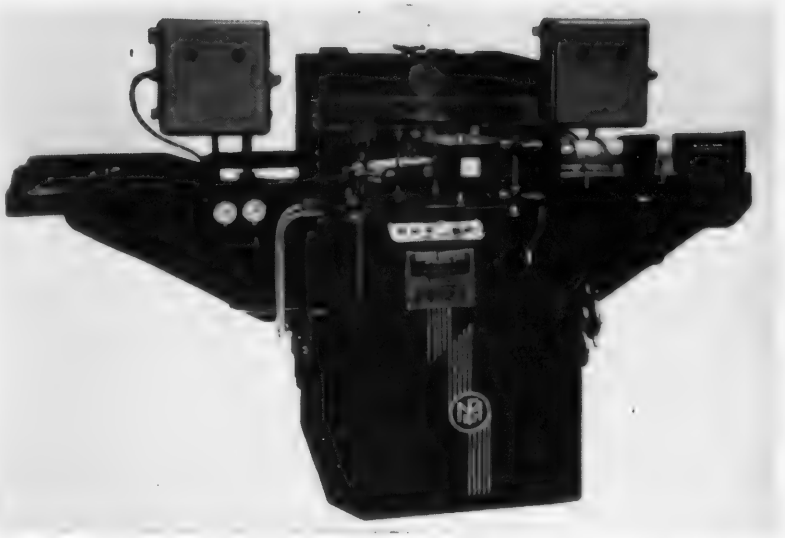
An ash tray, made for them by the Delft Porcelain Factory of Holland, has been issued to commemorate the event. The London sales office, L. I. Silber and Co. of Eastcheap, have sent us one of these attractive souvenirs.

Automatic Tying Machine

Now available on the British market are two types of automatic string tying machine made by the Croxted Manufacturing Co. The first model is a 16 in. manual cross tyer which makes single, double, or cross ties without adjustment on packages up to 16 in. × 9 in. and all intermediate sizes. Cross tying would be necessary for odd shaped labels, slippery cartons, etc. The second machine available is a large set-up box tyer for stacks of rigid boxes up to 34 in. × 25 in., which places a double wrap of soft cotton twine one way round the stack, with no adjustment required for varying sizes.

The tying machine takes the twine from a cone, automatically wraps one, two, or cross ties around the package under tension, ties a secure knot, and leaves the machine ready for the next package, without any waste of twine. The machine runs from a fractional h.p. motor plugged into the lighting circuit, is easily operated, and saves both time and labour.

The automatic string tyer saves both time and labour.



The Thermofix automatic labelling machine was shown at the Canadian International Trade Fair, held at Toronto.

Automatic Labelling Machine

A recent development by Morgan Fairest is their Thermofix automatic labelling machine. Designed specially for the application of thermoplastic labels, this machine incorporates dual electronic control, is equipped with variable speed, and will apply labels at speeds ranging from 30 to 200 per minute, according to size.

Oil Extraction

A new continuous solvent extraction plant has been manufactured by Rose, Downs and Thompson. Designed particularly for the production of Ardil fibre meal, this equipment could be used for a variety of oil-bearing seeds. Approximately 80 per cent. of the oil contained in the seed is first removed by crushing in expellers, and then an extractor removes almost all the remaining oil, leaving about 0·5 per cent. in the finished meal. The extractable protein suitable for Ardil fibre constitutes about 40 per cent. of the finished oil-free meal, and once the protein has been removed, the residue is used in the production of feedingstuffs for livestock.

Battery-operated Trucks

A range of battery-operated trucks which are used extensively for handling food products has been produced by Steels Engineering Products. Two loadcarriers are included in the range, one for 30 cwt., the other for 40 cwt. A 40 cwt. tiering truck and a 50 cwt. low lift truck are other versions of the design.

Running costs of this type of truck are kept to the minimum, owing to extremely economical battery charging facilities. The battery is conveniently housed beneath the load platform, which can be of steel chequered plate or timber as required.

Free from noise, fume, and fire risk, the trucks consume no expensive liquid fuels and their simplicity in design and construction combines to ensure 100 per cent. efficiency over long operational periods with the least amount of maintenance.

These trucks embody the instinctive bodyweight steering principle, whereby the steering is operated by the bodyweight transfer on the pivoted driving platform — leaving the hands free for braking and speed control.

Coles mobile crane handling sacks in a warehouse yard.

Import Cuts announced in Budget

QUOTAS FOR REMAINDER OF 1952 NOW FIXED

The Chancellor of the Exchequer announced in the House of Commons on March 11, 1952, that it would be necessary to withdraw Open General Licences for a further selected list of imports from Western Europe and certain other foreign countries. To implement this decision, the Board of Trade revoked, with effect from March 12, 1952, Open Licences under which the commodities affected had hitherto been imported freely from these countries. Importers were subsequently invited to apply for separate licences to import certain commodities, and in view of the delay in submitting applications, the Board of Trade warned importers that it would not be possible to consider any applications received after May 5.

Import licences have already been issued to enable importers to take deliveries against contracts which were entered into before March 11, 1952. The value of such licences will be deducted from the value of the licences to which importers will be entitled under the quotas for future trade.

The Board of Trade now announce that quotas have been established for the commodities listed in the attached Schedule and that licences for the import of these items will be issued (subject to the necessary applications having been made and subject to deductions in respect of licences issued in respect of contracts) for the value shown in the Schedule. In allocating individual licences within the quotas, account will be taken of the value of imports made by individual applicants during the period January 1, 1951, to December 31, 1951. Licences for these commodities will be valid until December 31, 1952, and importers will be free, within the value of their licences, to import from any one or more of the countries covered by them. Licences will be issued as soon as possible.

The total value of licences available for imports during the period March 11 to December 31, 1952, notwithstanding the deductions from quota entitlements in respect of licences already issued on account of existing contracts, is likely to be substantially greater than the value of the quotas shown in the Schedule. This is because many importers have entered into contracts substantially greater than their share of the quota. Moreover, the Trade Returns include imports on Government account against Defence contracts, which in some cases, notably textiles, were very substantial in 1951; any imports of these goods on Government account in 1952 will be made outside the quotas. It follows that the quotas do not provide a basis for a comparison of probable imports with imports in the corresponding period of 1951 as recorded in the published Trade Returns.

The principal foreign countries concerned are (*a*) *O.E.E.C. countries and their dependencies:* Austria, Belgium, Denmark, France, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland, Trieste, Turkey, Western Germany, and (*b*) *Other countries:* Afghanistan, Anglo-Egyptian Sudan, Bhutan, Brazil, Chile, China (including Manchuria), Egypt, Ethiopia, Finland, Formosa, Indonesia, Israel, Lebanon, Paraguay, Peru, Saudi Arabia, Siam, Spain, Syria, Uruguay, Yemen.

Of interest to food manufacturers are the following:

Quota number	*Full description of goods*	*Quota (£ c.i.f.)*
130.	Gelatine, edible ..	475,000
131.	*Bladders and casings, natural or artificial	1,600,000
132.	Cheese and ham spread Cheese, natural, except Cheddar, Cheshire, Derbyshire, Dunlop, Lancashire, Leicestershire, and White Wensleydale Cheese, processed (prepacked ready for retail sale in portions of a net weight not exceeding 8 oz. each and bearing on the wrapper or container of each portion a clear indication of the variety of the natural cheese), except cheese made from Cheddar, Cheshire, Derbyshire, Dunlop, Lancashire, Leicestershire, and White Wensleydale ..	4,500,000
133.	Malt extract ..	5,000

* Licences issued within this quota will also be valid for imports from the U.S.A., Canada, and Guatemala.

Krilium Soil Conditioner

That they are taking immediate steps towards the British manufacture of Krilium soil conditioner has been announced by Monsanto Chemicals. Initially, quantities sufficient for wide scale trials will be made available this summer to research organisations at present carrying out field tests on Krilium in Great Britain. The company also hope to increase the number of organisations carrying out such tests. Plans for commercial distribution will be announced later.

The product is at present being tested, in co-operation with the Agricultural Research Council, at ten agricultural research stations in Great Britain. Further trials are being organised by the National Agricultural Advisory Service at various centres under its control. The number of organisations carrying out trials is expected to increase considerably as supplies of British-made Krilium become available and as the field of investigation is widened.

The trials, which will cover a wide variety of British soil types, are designed to obtain information on (1) production and maintenance of good soil structure, (2) workability, (3) moisture relationship, (4) germination of test crops, (5) rate of growth, and (6) crop yield and quality.

Crops which are being studied are barley, carrots, chrysanthemums, clover, grasses, lettuce, oats, strawberries, sugar-beet, tomatoes, tree seedlings, tulip bulbs, and wheat.

Society for General Microbiology

At the Annual General Meeting of the Society for General Microbiology held at Oxford on April 15, the following were appointed Officers and Committee for 1952-1953:

President: Mr. H. J. Bunker.
Hon Secretaries: Dr. J. G. Davis (General), Dr. E. F. Gale (Meetings).
Hon. Treasurer: Dr. R. Lovell.
Committee: Dr. C. H. Andrewes, F.R.S., Dr. P. W. Brian, Prof. W. Brown, F.R.S., Prof. K. E. Cooper, Prof. A. W. Downie, Dr. Lilian Hawker, Dr. Betty Hobbs, Prof. H. B. Maitland, Prof. J. W. McLeod, F.R.S., Dr. N. W. Pirie, F.R.S., Mr. H. Proom, Mr. G. Sykes, Dr. W. E. van Heyningen, and Sir Alexander Fleming, F.R.S. (representing the International Association of Microbiologists).
Hon. Editors: Prof. B. C. J. G. Knight and Mr. A. F. B. Standfast.
Hon. Associate Editors: Prof. W. Brierley, Dr. S. T. Cowan, Dr. T. Gibson, Dr. A. T. R. Mattick, Dr. A. A. Miles, Dr. R. H. Nimmo-Smith, Dr. K. M. Smith, F.R.S., Dr. A. W. Stableforth, Dr. R. E. O. Williams, Dr. D. D. Woods, F.R.S., Dr. N. G. Heatley, and Dr. J. H. Humphrey.

In addition to a paper reading session a symposium on "The Nature of Virus Multiplication" was held on April 16 and 17 and attended by over 300 microbiologists. The papers and discussion in this symposium will be published in book form under the editorship of Sir Paul Fildes, F.R.S., and Dr. W. E. van Heyningen.

OBITUARY

Mr. C. R. W. Rempler, for many years a director of Hiron and Rempler, on May 7.

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Mr. L. B. Rayner, secretary and director of Sydney Webster, and for 30 years with the company, on May 7.

Lord Woolton Visits B.B.I.R.A.

The Lord President of the Council, Lord Woolton, his Parliamentary Private Secretary, Lord Fairfax, and Sir Ben Lockspeiser, Secretary of the D.S.I.R., recently paid an informal visit to the British Baking Industries Research Association at Chorleywood. After luncheon, the party toured the Research Station in the company of the chairman, Dr. R. T. Colgate; the chairman of the Finance Committee, Mr. R. N. Cannon; and the Director, Dr. J. B. M. Coppock.

From left to right are: **Lord Woolton** *(second from left),* **Sir Ben Lockspeiser, Dr. J. B. M. Coppock, and Mr. R. N. Cannon. Dr. Coppock shows the party a sample of bread made from flour which has been "improved" by a method alternative to Agene treatment.**

Carton Makers and Users Confer

Users and suppliers of cartons discussed subjects of joint interest at the recent Boxfoldia Packaging Conference, during the course of which Dr. G. L. Riddell, F.R.I.C., Director of the Printing, Packaging and Allied Trades Research Association, spoke on the work of the Association. Questions following this talk concerned the PATRA journey shock recorder and the variation of colour on the machine run. Dr. Riddell said that this variation was caused by the difference in ink film thickness on the run, and was also affected by such things as temperature changes or bad setting of the machine. The Association was trying to develop an electronic eye which would signal colour variations on the machine run.

"Training for Management" was the title of another paper read by Miss Beryl Foyle, joint managing director of Boxfoldia. Miss Foyle, who was a member of the Productivity Team on Management Education, gave a summary of the team's findings on American practice both in industry itself and in the universities and training colleges.

Concerning productivity, Miss Foyle said that the team had tried to decide what management did in the United States that made productivity relatively higher there than in Britain. Sir Robert Hyde, K.B.E., M.V.O., in his remarks as chairman, had spoken of the revolution in thought on the conception of management which had taken place over the last century; Miss Foyle commented on the fact that in the States business ranked very high—equally with law and medicine and much above the civil service or politics. Industrialists and those responsible for training for industrial management, recognised the social responsibility of industry. They worked closely together, many business executives holding part-time university appointments and those in universities were eager and were encouraged to give a consultative service to industry. This interchange was stimulating and immensely valuable.

Members of the conference also saw an exhibition prepared by the British Federation of Master Printers which told the history of printing and demonstrated the technique of letterpress, lithography, and gravure.

APPOINTMENTS

Mr. D. R. M. Small has had to relinquish his appointment as secretary to the Self-Service Development Association owing to pressure of business commitments. The Association has acquired the services of Mr. M. W. Paynter, A.C.C.S., present secretary of the Institute of Packaging, and the Institute of Materials Handling.

Mr. L. Turvey, who has been wholly engaged in representing Lautier Fils for several years in the London area, has now been joined by two other full-time representatives, Mr. E. W. Mann and Mr. A. Roussel, who will help him to cover the London area and Home Counties and keep pace with the continuous expansion of the company.

Cereal Pack

A new catering pack has been developed as a direct result of the steadily increasing demand for Weetabix from schools and other institutions where meals are served in bulk. Until the introduction of the new pack, the bulk purchaser could buy only the ordinary domestic cartons containing one or two dozen biscuits. The special pack contains two gross. This obviously eliminates twelve separate packing processes, and the resultant savings in labour and materials have been passed on to the purchaser.

Exhibits at the British Food Fair

It is two years since the first British Food Fair was held, but so great was the interest aroused that a second exhibition is to be held at Olympia this year, from July 5 to 19.

In addition to the wide selection of food products, visitors will also be able to see the latest developments in machinery, packaging, and hygiene.

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Hygienic Food Bags

On view at the stand No. 18 of Oppenheimer Casing, will be their latest washable hygienic food bags. Made from a completely non-toxic, odourless, tasteless, waterproof, and greaseproof material, the Hypak polythene bags are very suitable for the storage of food.

This company are known mainly for their association with meat and sausage manufacturers and on their stand will be showing some entirely new ideas in sausage presentation.

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Packages for Food Products

Corrugated fibre board containers designed for a wide range of food products will be exhibited by the Thompson and Norris Manufacturing Co., on stand No. 99. The exhibit is divided into four main sections showing packs especially designed for transport by rail, road, sea, and air, bearing the appropriate railway or export certificate.

Items of special interest include snap bottom trays which dispense with the necessity for sealing or stitching the bottom of the tray. Corrugated fibre board containers in coloured board, many printed with attractive designs, and wax impregnated cases are also to be shown. The exhibit covers containers for fresh fruit, tomatoes, frozen fish, ice cream, and the majority of food products from eggs to canned and packet foods, together with specially designed gift and display packs.

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Cooling and Refrigeration Equipment

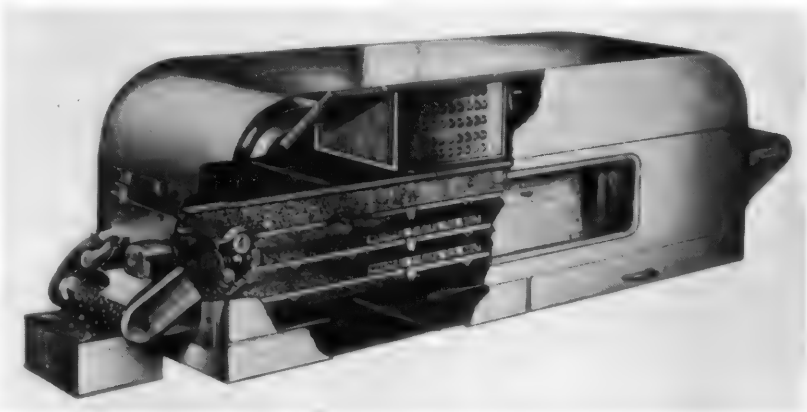
Cooling conveyors and refrigerated freezing tunnels are items of special interest to food and confectionery manufacturers to be shown on the stand of S.B. Engineering (No. 32a). The main exhibit is a working full size model of an entirely new type conveyor known as the S.B. Shuttle Conveyor (Patent Applied For). This machine is of special interest to the bakery trade for the rapid cooling of meat, fruit pies, and cakes, especially where these are produced on automatic conveyor type ovens.

The design of this conveyor is such that it will accommodate a large quantity of produce to be cooled while in itself occupying very little floor space. It can also be employed for the cooling of such articles as table jellies and other liquid foods which require "setting." The conveyor should prove of great interest to all food producers requiring plant which will provide continuous cooling of the products on a fully mechanised production line.

The company will also be exhibiting their new "Small Piece" cooling conveyor (Patent Applied For) which was originally designed for the cooling of wrapped toffees and other confections to permit immediate packing after wrapping.

The use of this machine entirely obviates the need for large arrangements of cooling shelves on which such items as toffees and boiled sweets have to be spread prior to packing.

Of interest to quick freezing processers will be a scale model of a one ton per hour quick freezing plant installed in the factory of a nationally known brand of quick frozen fruit and vegetables.



The "Small Piece" cooling conveyor for cooling wrapped toffees.

A Thompson and Norris pack for Heinz tomato ketchup. This is only one of a wide range of containers to be exhibited by the company.

Canned Products

Canned meats, fruits, and vegetables will be exhibited on stand No. 49a by L. I. Silber, U.K. distributors for the Dutch company Tieleman and Dros. Producing more than 30 commodities under the trade name Mill Brand, this company exports to all parts of the world, including America, and their products are becoming increasingly popular here.

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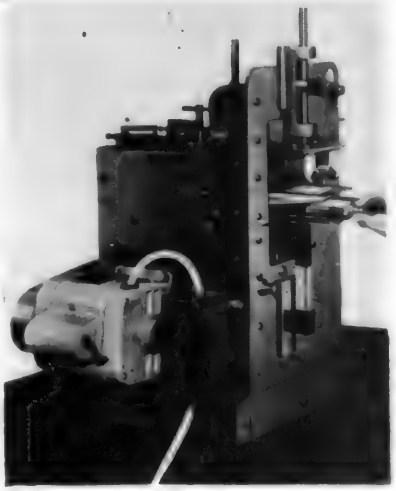
Honey Packs

On view at the Bear Honey stand (No. 102) will be 1 lb. jars of the Bear Brand pure honey, and Bear Brand breakfast spread. Also exhibited will be packs of Jamaican and Australian honey, together with Irish honey sections. The company will also distribute recipe books to those interested.



A semi-automatic labelling machine.

Labelling Machine

On the stand of Brand's, No. 49, will be shown two 22A semi-automatic labelling machines of D. Trapow. The portable nature of this type of machine makes installation extremely simple. Easily adjusted to fit most containers, it automatically rejects any bottles incorrectly fed and so prevents breakage and jamming. The rate of output can be adjusted up to a maximum of 200 dozen bottles per hour.

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Non-electric Magnetic Separators

Three new types of permanent magnetic separators, known as the K.A., K.B., and K.C. type Magnaplates, will be shown by Rapid Magnetic Machines on stand No. 107. Needing no electric current, they operate with very little cost, and maintenance is negligible. The equipment has been designed to give maximum magnetic strength, coupled with simple installation, and is adaptable for wet or dry processes. It has been specially engineered to meet the requirements of the food, confectionery, and other industries which are troubled by tramp iron in their processing, or final products.

▪

Metal Detection

For many years now Cinema-Television have specialised in the design and manufacture of high grade metal detecting equipment and on stand No. 114 they will be showing their very latest equipment. Their new Cintel metal detector is smaller, lighter, more compact, and more sensitive than anything supplied hitherto, and has been especially designed for applications where a large number of detectors is required. Known as the Multi-Channel detector, this equipment will control up to six separate conveyor lines with independent alarm systems for each conveyor.

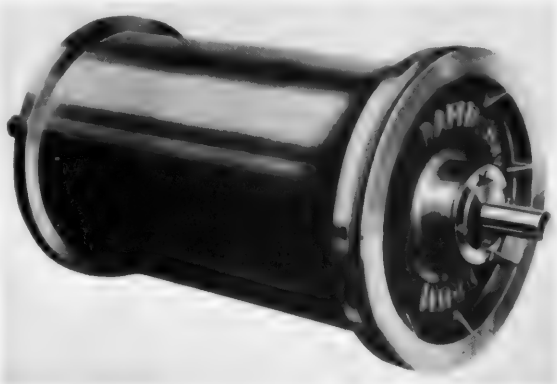
On the stand, demonstration equipment will be available on which interested manufacturers may try their own products.

Dried Fruit Trade

Representatives of organisations interested in the dried fruit trade were told by the Minister of Food at a recent meeting that currency restrictions were the chief obstacle to a resumption of import and distributional freedom for dried fruit. Because of the deficit position which had developed in the European Payments Union against the United Kingdom, severe cuts in food imports had already had to be made. The whole future would depend on the results of that action, but in any event currency restrictions were likely to remain a major consideration for some time. Also the dollar question had an important bearing on the situation.

He assured the trade representatives that the Ministry would continue to work for freedom with all its power, but emphasised that the time when decontrol could be achieved would unavoidably be governed by external factors.

The meeting was held by arrangement with the National Dried Fruit Dealers (War Emergency) Federation, under whose auspices a Joint Committee, representing all the organisations interested in the dried fruit trade, was formed last year. This Committee has offered its services to the Minister in an advisory capacity.



The Permaflux drum separator for the removal of tramp iron from a variety of products where continuous operation is required.

Testing Apparatus

Interest has recently been displayed in Palin's method of estimating chlorine and chloramines by means of neutral ortho-tolidine. Available for use with this method is a Lovibond comparator which has been manufactured by The Tintometer Ltd. This comprises a series of permanent glass colour standards for performing routine colorimetric tests. Consisting of a moulded case with interchangeable discs, each containing nine colour standards for a specified test, this comparator is suitable for a very large range of tests required in metallurgical, food, water, and agricultural investigation.

Author Studies U.S. Methods

Mr. M. K. Schwitzer, author of the book "Continuous Processing of Fats," published last year by Leonard Hill Ltd., has just returned from a 20,000 miles trip to South America, Mexico, and the U.S.A. He visited a number of firms interested in British chemical plant and has in particular made a thorough study of the vegetable oil industry in Mexico. In the U.S.A. he visited several of the most up-to-date oils and fats processors and had an opportunity of comparing American and European methods.

New Scottish Cannery

The opening of a new cannery at Ayr by Henry Sutton, Ltd., of Great Yarmouth, provides an outlet for West Coast fishing which has been long sought. Clyde and West Coast men have argued that the area demands processing points to handle the catch on the spot.

Latterly Ayr has been a most popular port of landing because of the short haulage distance to the main markets, and the location of the new cannery at Ayr is a logical move. Its advantage over East Anglia is that it offers a year-round season. Should the West Coast supplies fail, fish can be imported.

Some 5,000 sq. ft. in an ice factory have been allocated for the initial layout. This can be expanded as the plant progresses and its success is assured. The present throughput capacity is in the region of 20,000 cans per day rising to 30,000. Much of the canned produce will go to world markets but a certain proportion will go to home outlets. The first pack includes herring in tomato, fresh herring, and tinned kippers. Vegetable and fruit packing are planned.

The new factory was officially opened by Provost Hart of Ayr, who promised the full support of the town in the development of the new industry.

BOOKLETS RECEIVED

A brochure describing their latest equipment for laboratory use has been published by Griffin and Tatlock.

■

A selection of their latest types of hand-operated trucks is shown and described in a brochure published by the Tyne Truck and Trolley Co.

■

Bushes and pulleys and V-Belt drives in Swiss textile factories are the subjects of two leaflets which have recently been published by J. H. Fenner and Co.

■

As one of a short series of technical monographs on different aspects of refrigeration, a treatise entitled "Marine Refrigeration" has been published on behalf of the Institute of Refrigeration. (Price 7s. 6d.)

*

Descriptions and illustrations of the different types of single roll breaker for reducing ash, coal, coke, fireclay, gas oxide, and caustic soda are contained in a catalogue issued by British Jeffrey-Diamond.

■

Details of the Ski-Wracker manufactured by Geo. W. King are contained in a newly issued folder. This equipment, which runs on overhead rails, lifts up to 30 ft. in height and up to 10,000 lb. in weight.

■

A number of useful hints on the benefits derived from the use of hot water in the home and information on economical methods by which hot water on tap can be obtained with the help of gas are obtained in a booklet "Hot Water for Health" published by the Gas Council.

■

In a leaflet recently issued by the Cambridge Instrument Company is described the company's needle pyrometer which has been designed for the rapid and accurate determination of the temperature below the surface of plastic or semi-plastic materials.

Change of Address

The Scottish Area Sales Office of George Ellison is now situated at 7, Woodlands Terrace, Glasgow, C. 3.

The new telephone number will be Douglas 5335 and the telegraphic address Induction, Glasgow, C. 3.

Closed for Holidays

It has been announced by Gale and Mount that from August 1 to 17 their works will be closed for annual holiday.

OBITER DICTA

● The problem of unwanted shops in Bolton is greater than anywhere else in the country. —*Mr. Henry Morgan, President of the Federation of Fish Friers.*

● The public should be asked not to throw bread in the road instead of in the food bins.—*Councillor H. Hargreaves, Crompton Health Committee.*

● Do not be afraid to complain if you see unhygienic conditions and careless food handling—it may be your family who will suffer.—*Miss P. Hornsby-Smith, M.P.*

● I wonder how many people realise that we are really within sight of possible starvation of both raw materials and food? —*Major-General K. C. Appleyard, President of the Institution of Production Engineers.*

● There are a great many misguided individuals who, when you mention black puddings, purse up their faces in almost perfect imitation of a disgusted Pekinese. If you are one of the Pekinese brigade do you, after all, know how to cook them?—*Sheila Hutchins, writing in the "News Chronicle."*

● It is true that birds are being marketed which would not normally be marketed at this time of the year. This is because, with the increased price of feedingstuffs and the decreased price of eggs, many are finding that egg production is no longer an economical proposition.—*Mr. S. G. Grant.*

● I do not believe that as a nation we are going to be content to become complete vegetarians. We are heading that way, and there will be a revolution if our masters try to make us go much further. We shall have to get more meat. —*Mr. A. D. Buchanan-Smith, Institute of Animal Genetics, Edinburgh University.*

● A few days ago I went into a local café for tea, and in addition to being surprised at its cost—2s. for a cup of tea, half a slice of sausage roll, and two slices of bread—I was shocked to see several loaves of unwrapped bread on a shelf and a large grey cat perched on top of the bread. — *Correspondent to "Birkenhead News."*

COMPANY NEWS

At the annual general meeting of Wm. P. Hartley Ltd., the directors recommended that a final dividend of 5 per cent. less tax at 9s. 6d. in the £ be paid on the Ordinary shares for the year ended October 31, 1951, making 10 per cent. for the year.

*

At the annual general meeting of Unilever and Unilever N.V., it was recommended that the following declarations of final dividends on the Ordinary Capital should be paid on July 4 in respect of the year 1951. In the case of Unilever, a dividend of 8½ per cent. actual, less income tax at 9s. 6d. in the £, making 13½ per cent. for the year ended December 31, 1951, should be payable to stockholders registered in the books of the company on May 31, 1952. In the case of Unilever N.V. a dividend of 7½ per cent. actual, making 12 per cent. for the year ended December 31, 1951, should be payable, less 15 per cent. dividend tax, on presentation of the appropriate dividend coupon.

*

In his statement presented at the fifteenth annual general meeting of Procea Products, Dr. D. W. Kent-Jones, Ph.D., B.Sc., F.R.I.C., chairman, reported that satisfactory progress had been made by the company. This was reflected in increased turnover, larger gross trading profit, and the highest net profit in the company's history.

Developments in the company's three factories were also reported. In the original Hanwell factory a completely new starch plant had been installed. At Irthlingborough work has been completed in connexion with the making of a cold water paste from a certain grade of the company's wheaten starch which will shortly be marketed, and a new flour blending plant and gluten drying plant have been installed at Colnbrook.

*

The consolidated net profit of L. Rose and Co. for the year ended December 31, 1951, after debiting all charges, including taxation of £64,356, is £49,361. After allowing for a net stock adjustment of £10,846 at December 31, 1950, the figures for last year were taxation £87,531 and net profit £80,325.

An interim dividend of 5 per cent. (actual) was paid on the Ordinary Shares on October 31 last, prior to the issue of the new Ordinary Shares, and the directors now recommend a final distribution of 12½ per cent. (actual) on the Ordinary Capital as increased. These dividends absorb a net amount of £21,960 against £17,977 in the previous year.

World Food News

FORTHCOMING EVENTS

Fisheries Exhibition in Nova Scotia

Products to be displayed at the Fisheries Exhibition to be held in Lunenburg, Nova Scotia, from September 9 to 13 are fish and fish products, fish packaging equipment, ships' gear, fishing equipment, and marine engines. It is understood that participation by United Kingdom firms through their local representatives will be welcome. United Kingdom firms interested in this event should advise their agents in Canada to write to the Manager of the Exhibition, Mr. B. J. Walters at the Town Hall, Lunenburg.

*

Food Exhibition in Montreal

A public food exhibition organised by The Canadian Food Exhibit Inc., will be held in Montreal at the Show Mart Building from October 15 to 19, 1952.

This should be a suitable show for British foodstuff manufacturers and producers of allied lines such as cleansers, etc., who are already represented in Canada and have established distribution arrangements.

Interested United Kingdom firms should remember that any literature and packages displayed at the Show will fail to make any impact unless they are in both French and English.

*

Nutritional Research

A European Symposium, "Present Problems in Nutritional Research," is to be held under the auspices of the International Union of Nutritional Sciences, at Basle, Switzerland, from October 1 to 4 inclusive. The local organiser is Prof. F. Verżar (Physiological Laboratory, The University, Basle, Switzerland) to whom enquiries may be addressed.

Fuller information about the International Union of Nutritional Sciences can be obtained from the Honorary Secretary, Dr. Leslie J. Harris, Dunn Nutritional Laboratory, Milton Road, Cambridge.

Pasteurising Liquid Whole Eggs

An effective method of pasteurising liquid whole eggs, employing equipment ordinarily used for pasteurising milk, has been developed by the U.S. Department of Agriculture. Research tests have demonstrated that a process in which a temperature of 140°F., which is just below the coagulation level, is held for three minutes, proves effective in eliminating salmonella, the functional properties of the liquid egg remaining unaffected by the process.

No Cheese Ration in Norway

The rationing of cheese in Norway ended on July 1. Sugar and coffee are now the only major foodstuffs still rationed.

The amount of cheese produced in Norway last year was 30,000 tons compared with 18,000 tons in 1939. The Supply Directorate states that Norwegian production should be sufficient to meet demand when rationing ends, but, if necessary, foreign cheese will be imported to swell the supply.

Dollar Savings

A sharp rise of the standards movement in the United States since the war, especially in the past two years, is indicated in "Dollar Savings through Standards," a report published by the Productivity and Technical Co-operation Division of the American Mutual Security Agency.

The survey, the first of its kind, is an attempt to compile a body of measurable proof in terms of dollars or percentages of net savings and specific economic benefits attributable to standardisation. It reports 140 documented case studies, covering 81 industries and industrial products.

A U.S. Packaging Exhibition

At present on an extensive business tour of America, Mr. Arthur R. Smith, managing director of Autopack, has some interesting comments to make regarding the recent Packaging Exhibition at Atlantic City, where a selection of his company's machines was displayed.

The exhibition included a large collection of the latest types of high-speed machines, many of them exceptionally ingenious both in design and construction.

American manufacturers rightly regard packaging as part of the product, and their flair for high pressure salesmanship is evident in the very high standard achieved—somewhat far removed from our own present paper starved and austerity minded economy. The American public has become naturally conditioned to expect a well-wrapped article, and everything is sold in attractive Cellophane wrappings and cartons.

While America has the reputation for being the home of modern machinery, this year's exhibition was remarkable for the increasing number of British and continental machines on show.

Mr. Smith was impressed by the great technical wealth of new machinery and equipment, and he is more convinced than ever of the great future for British packaging machinery in world markets. He bases this view on the fact that in advanced design, workmanship, accuracy, and trouble-free operation, the British machines compared most favourably with the best in the exhibition.

In many industries, Britain's ever present need to export has been greatly complicated by the increasing restrictions on imported raw materials. Mr. Smith points out that, particularly in view of such circumstances, packaging machinery is an ideal form of export because only a comparatively small amount of imported material is used in manufacture—the greater part of the total value of the product consisting of skilled labour.

Mexican Meat Freezing Plant

A deep-freeze meat storage plant is to be built near Mexico City, financed by bonds issued by the Government of the Federal District. It will have an initial capacity of 3,000 carcasses, but will be expanded later to 40,000 carcasses.

Desert Locust Warfare

International action on an unprecedented scale has been taking place in the Middle East where a plague of desert locusts is threatening the entire food supply of agricultural countries from Africa through Asia Minor to Asia.

In some areas serious breeding is going on, which means that a new generation of young locusts will soon be on hand threatening the cotton and grain of the Nile Delta on the one side and the rice fields of India on the other.

Jordan is one of the most seriously infested countries, and is, furthermore, a centre of serious breeding which is as great a threat to neighbouring countries as to Jordan itself. Realising its inability to cope single-handed with the locusts, an emergency call for help was sent out as a result of which technicians from Syria, Turkey, Lebanon, Iraq, Saudi Arabia, and Egypt were flown to Jordan to study the methods of control required to prevent the total destruction of food crops.

New Canning Plant for Australia

A A£25 million canning plant is to be built by H. J. Heinz at Dandenong, near Melbourne. Construction is scheduled to begin in the near future and it is hoped to start actual production in 1953.

New Advertising Agency in U.S.

The primary purpose of a new branch advertising agency opened in Los Angeles by Graham and Gillies is to assist British manufacturers wishing to promote sales in America. The whole of America represents too large a territory for most manufacturers to contemplate as regards distribution and advertising.

The secondary purpose is to secure American advertising business for the scheduled territories and Europe.

Chairman of the Los Angeles Branch Agency is Mr. William Macrae Gillies, chairman and managing director of the London office.

Selective Food Weighing

A new apparatus that permits cumulative and consecutive weighing has recently been developed by the Richardson Scale Company, Clifton, New Jersey. Known as the Select-O-Weigh, the new unit affords automatic weighing methods within the range of small food plants, and requires only a single scale to accomplish the same work that formerly required twelve. The sequence of adding material ingredients is selectively controlled and properly timed. In this connexion, control circuits may be arranged to provide either delivery of consecutive weights of varying amounts according to a predetermined schedule or, alternatively, accumulation of a total batch of a preselected formula and its discharge into a hopper or mixer.

Controlled by a simple electronic circuit with no arcing contacts, a standard type automatic scale is used as the weighing element with a pendulum dial scale acting as the force-measuring component. A master control panel includes a setting dial for each of the ingredients in the mixing formulae that are to be handled. In operation, each dial on the control panel is set to correspond with the ingredient requirements of the particular formula. After the control panel has been set, a button is pressed to start the screw feeder mechanism.

Pumping Pickle

The Meat Inspection Division, USDA, has ruled that di-sodium phosphate may be added to the pumping pickle for cooking and canning hams, pork shoulder picnics, and the like. The pumping pickle may contain not more than 5 per cent. of di-sodium phosphate. The use of such pickle, it is emphasised, shall not result in a content of more than 0·5 per cent. of the added phosphate in the finished product. When di-sodium phosphate is used, a statement such as "di-sodium phosphate added" or "with added di-sodium phosphate" must be prominently displayed on the label in direct connexion with the name of the product.

Canned Meat for U.S.

West German meat specialities, such as canned hams, which Britain recently stopped buying under the Government's import cuts, are to be exported to the United States. It is expected that between 13 and 15 million dollars' worth will be bought annually as a result of an amendment to Department of Agriculture regulations.

The artistic stand of W. J. Bush and Co. at the International Sugar Exhibition, held at Amsterdam recently.

AMIF has New B_{12} Test

The American Meat Institute Foundation is employing a new approach for the determination of the content and availability of vitamin B_{12} in foods. One method of analysis and evaluation calls for the time-consuming feeding of laboratory animals, but a more rapid technique uses micro-organisms as the test agent.

According to a report of research conducted by Harold E. Scheid and B. S. Schweigert, chief of the Foundation's division of biochemistry and nutrition, a satisfactory method has been developed for microbiological assay of vitamin B_{12} in animal tissues.

Although comparatively little accurate data have been available on the amounts of vitamin B_{12} that are available in the various types of animal tissue, assays run as a part of the experiments conducted at the Foundation show that beef liver contains approximately 25 times and beef kidney approximately 10 to 15 times as much B_{12} activity as pork, beef, or lamb muscle cuts.

New Zealand Dairy Produce

New Zealand increased her output of dairy produce by three per cent. in the first nine months of the current season with a rise of about 10,000 tons in butter manufacture. Cheese production has dropped compared with last year. According to an agricultural survey, dairy cows have increased three per cent. to a total of 1,898,000 compared with 1950.

Storage Life of Lemons

The storage life of lemons can be extended several weeks, and their fresh quality retained, by wrapping them in several different transparent films and holding them at 50°F. Tests conducted by the U.S. Department of Agriculture revealed that lemons held at this temperature kept without loss of weight or shrivelling when wrapped in either perforated or non-perforated Pliofilm or moisture-proof Cellophane; one to four weeks in non-perforated semi-moistureproof Cellophane; one to two weeks in non-perforated cellulose acetate paper; and one week in ordinary paper bags with Cellophane windows. Unwrapped lemons stored at the same temperature lost nearly 5 per cent. in weight at the end of four weeks.

Herring Research

An experimental factory for research into herring processing problems has been opened at Tjaereviken, near Bergen, Norway. The factory will experiment with new production methods for herring meal and oil.

OVERSEAS ENQUIRY

Foodstuffs and Food Specialities

Mr. Frank Ryser, President of the Frank Ryser Co. Inc., 315, N. Clark Street, Chicago, desires to receive offers from United Kingdom manufacturers of biscuits, jams, marmalades and preserves, jellies (specialty items only), sauces and pickles, decorations for cakes, etc., canned fish, chocolate and confectionery (specialty items only), and items suitable for repacking into Christmas hampers.

These products are required for two types of trade, *i.e.* for distribution through wholesalers and chain stores, and for sale to delicatessen and grocery specialty stores.

These products are subject to the U.S. Food and Drugs Administration regulations.

Firms interested in this enquiry are asked to communicate direct with Mr. Frank Ryser, sending small samples and examples of labels, packages, etc., together with quotations in sterling f.o.b. United Kingdom port or in dollars c.i.f.

Tomato Grading

A new unit that combines a soak tank, spray washer, and tomato grader has recently been introduced by the Berlin Chapman Co., Berlin, Wisconsin. The conveyor in the unit consists of a combination roll chain and rod construction with a spacing between the conveyor rods of 2⅜ in., which carries the tomatoes out of the soak section beneath a series of water sprays for dirt removal. Larger and more nearly perfect tomatoes that are suitable for peeling and packing whole pass over the conveyor and into the scalder.

Nitrite in Food Processing

Unlike many other countries, until the beginning of the current year, the use of nitrites in the pickling of meat was forbidden in Italy.

The Association of Animal Canning Industries has been fighting strenuously with the help of the technical press for the abolition of this prohibition. The problem was finally submitted to the attention of Italian Health Board, Superior Health Institute, and High Commissioner for Hygiene and Public Health.

After discussion, those institutions gave their approval, and the Italian High Commissioner for Hygiene and Public Health has now authorised the use of sodium and potassium nitrites in the preparation of sausages and other processed meats.

The use of saltpetre is also allowed and all three substances may be used together for a given meat product, but their total amount must not exceed 15 parts per million of finished product.

The Nicholas Appert Award

GOES TO EMINENT AMERICAN FOOD TECHNOLOGIST

Edward MacKay Chace.

The Nicholas Appert Award, bestowed by the Chicago Section of the Institute of Food Technologists for outstanding achievement in the field of food technology, this year goes to Edward MacKay Chace, who has devoted a lifetime of service to food technology.

Born at Havana, N.Y., in 1874, he attended grade and high schools in Washington, D.C. Courses in chemistry at George Washington University and study of law at the National University Law School prepared him well for his role in the food industry. This excellent legal training later guided him in his important work on standards for citrus products.

Mr. Chace worked as a sugar chemist for two seasons in Cuba and three seasons in Louisiana. He later entered the U.S. Department of Agriculture in 1898, but was transferred to the Cuban Customs Service at Havana where he served as Chief Chemist. Returning to the U.S.D.A. in 1903, he advanced from Assistant Chemist to Principal Chemist in charge of the citrus by-products laboratory and the fruit and vegetable chemical laboratory. He retired from the Bureau in 1944 after 41 years of continuous service.

In 1908, Mr. Chace was sent to Sicily by the U.S. Bureau of Plant Industry to survey the citrus fruit and citrus products business there. Application of his observations plus extensive research into citrus by-products laid the foundation for the vast citrus technology of Florida, California, Texas, and Arizona.

His work was instrumental in establishing the fundamental standards of maturity for many fruits and vegetables, and particularly for the citrus industry. At his recommendation, a laboratory was established in 1912 at Los Angeles to carry out the standardisation work. Many of these standards formed the basis for food processing operations under the Federal Food and Drug laws.

Mr. Chace extended his studies to the effect of ethylene gas on fruits, walnuts, and certain vegetables; canning and by-products of other fruits and vegetables; food control chemistry; essential oils; preservation of foods by freezing; and dehydration of fruits and vegetables. His scientific publications on these subjects are numerous.

High official recognition came to him in the closing years of his service with the Federal government. In 1943, Mr. Chace was detailed to the Office of Economic Warfare. He was sent to Brazil to strengthen the agricultural ties of the United States and its Latin American neighbours by means of technological advice.

A charter member of the I.F.T., Mr. Chace has held the office of vice-president. He served as a councillor for the American Chemical Society and was awarded its 50 year membership certificate. He also has held membership in the American Association for the Advancement of Science.

Productivity and Research

Twenty-five European industrial research scientists and administrators are touring the United States and Canada under the guidance of Southwest Research Institute to study American research methods, techniques, and systems. Countries represented include Austria, Denmark, Germany, France, Italy, Ireland, Norway, Great Britain, and Switzerland.

Meat Packing in Angola

A decree has been issued authorising the granting of a concession to exploit a frozen meat industry in the ranching districts of Angola.

The concessionnaire must be a public limited company in which the Governments of Portugal and Angola will have equal shares. The Portuguese Government will contribute machinery and equipment to be bought in the U.S. with a loan of 663,000 dollars granted by the Export-Import Bank. The Government of Angola will supply the funds necessary for the construction of the plants.

The scheme will be based on the findings of an ECA mission which visited Angola in 1951.

News from the Ministries

Resignation

Mr. H. Gordon Turner, C.B.E., Honorary Shipping Adviser to the Ministry of Food, has resigned his appointment.

Mr. H. C. Brewer, M.B.E., chairman of the Baltic Exchange Chartering Committee, has been appointed Honorary Shipping Adviser, and Mr. E. T. J. Gill, M.B.E., and Mr. A. E. Evans have been appointed Assistant Honorary Shipping Advisers to the Ministry of Food in succession to Mr. Turner.

Rice and Rice Products

The Rice Order, 1950, has been amended so as to increase the maximum price of rice and rice products at all stages of distribution with effect from June 15, 1952. The increases are necessary because of the continued world shortage of rice and the resulting rise in its price in supplying countries.

The new Order will also increase the permitted additional charges for prepacking rice from the existing flat rate of 2d. per lb. to 2½d. per lb. for packages weighing more than 8 oz. but not more than 1 lb., and to 4d. per lb. for packages weighing not more than 8 oz. The existing flat rate of 3d. per lb. for prepacking flaked rice will be correspondingly increased.

Amendment Order for Bread

An extension to the range of bread that may be sold free of price control has been made to include all loaves, rolls, and baps weighing 10 ounces or less. The restrictions now imposed on the weights of Vienna loaves and rolls and baps will also be removed and no fixed weights will be specified for any loaves, rolls, or baps weighing 10 ounces or less.

The new arrangements will enable bakers to supply bread in a wider range of quality and size, thus restoring some of the variety which existed before the introduction of control.

Sellers will be required to have standard-sized loaves (that is, loaves weighing 14 ounces or multiples of 14 ounces) which are subject to price control on sale at the same time as bread which is free of price control. As at present, sales of loaves, rolls, and baps weighing up to 2 ounces will be free of this condition.

The necessary further amendments have been made to the Bread Order, 1951.

Since bread made in weights of 10 ounces or less is now free of price control, it will not qualify for the bread subsidy.

Sugar, Syrup, and Invert Sugar

The Sugar (Control and Maximum Prices) Order, 1947, has been further amended so as to increase the maximum wholesale and retail prices of all sugar for manufacturing purposes by 4s. 8d. per cwt. and ½d. per lb. respectively. The new basic wholesale price of granulated sugar for these purposes in 2 cwt. bags will be 63s. 10d. per cwt. instead of 59s. 2d. and the retail price 7½d. per lb. instead of 7d.

Sugar for manufacturing purposes is unsubsidised and the present increase in price is necessary because of the increased costs of procurement.

Because of the rise in the cost of sugar for manufacturing purposes, the prices of syrup and treacle have also to be increased. The Syrup and Treacle Order, 1950, has thus been amended so as to increase the maximum retail prices by ½d. per lb. from June 15.

The Invert Sugar Order, 1951, is also being amended so as to increase the basic prices for invert sugar by 3s. 9d. per cwt.

Bread Subsidy for Northern Ireland

After consultation with the bakery trade, the Ministry of Food has announced that the rate of subsidy payable in Northern Ireland from September 30, 1951, is 13s. 10½d. per sack. This is in accordance with the recent decision to adjust the rate of subsidy from the end of the costed period on which the adjustment is based, and at the same time to discontinue the adjustment for "trends." The rate of 13s. 10½d. represents an increase of 4s. 8d. per sack on the previous basic rate.

The rate is increased to 14s. 0½d., 14s. 1½d., and 14s. 2d. from November 11, December 2, and January 13, respectively, to take account of various wage increases, and to 14s. 6½d. from March 16 to take account of the increase in the price of petrol.

From May 11, 1952, as already announced, the subsidy is increased by a further 1s. 11d. per sack to take account of the changes in the prices of flour and bread on March 16, 1952. This will bring the rate of subsidy up to 16s. 5½d. per sack from May 11 until further notice.

Provision has been made on Subsidy Claim Form B.S. 82 for a payment on account in respect of the above increases during the period September 30, 1951, to April 19, 1952. Subsidy Claim Form B.S. 83 will provide for the balance and for the repayment of 1d. "trends" from August 26, 1951, as well as for current payments from April 20, 1952.

Clotted Cream

The maximum selling price of clotted cream produced and sold by certain hill farmers in Devon, Cornwall, and Somerset, who hold licences issued under the Cream Order, 1951, has been increased by 1s. per lb. from 6s. 6d. to 7s. 6d. per lb.

Meat Prices and Rations

The average increase in the price of meat is 4d. per lb. over the whole range of carcass meat, but the actual increases vary with the different types of meat and cuts.

The prices for meat used in manufacturing will, as a consequence, be raised and will result in increases in the prices of most meat products. The Meat Products (No. 2) Order also removes the provisions whereby skimmed milk powder and vegetable fats may be counted as part of the meat content of sausages. Fat of animal origin will in future be supplied to sausage manufacturers and the rate of allocation of manufacturing meat will be increased.

Allocations to Food Manufacturers

The Parliamentary Secretary to the Ministry of Food, Dr. Charles Hill, recently held a meeting with the Food Industries Council to discuss methods of allocating scarce ingredients. Dr. Hill informed the Council that after very careful examination of the problem, the Minister of Food had decided it had become imperative to break away from the system of allocation according to pre-war performance where that system was still in use. The retention of a basis of allocation so far out of date was tending to frustrate enterprise and to create inequity. In general, the level of production in the food industries concerned had already reached, with the aid of unallocated materials, the level at which the Council had agreed in 1949 that a review of methods should take place, and the recent cuts in the imports of unallocated materials had made it desirable that a change should not be longer delayed.

Once the general principles of allocation had been revised, their detailed application to individual industries would be worked out by the Ministry of Food in close consultation with the industries concerned. The general principles would be formulated by the Ministry after consultation with a small group nominated by the Council, and announced as soon as possible.

Information and Advice

This Service is available for subscribers to FOOD MANUFACTURE. Postal replies will be sent if a stamped, addressed envelope is enclosed with enquiries.

Pickled Onions

B.5740. *Could you please give us a method for preventing the thin skin between the layers of onions separating when they are put into jars.* (Yorks.)

The cause of the trouble depends upon whether the onions used are brined or "raw." With brined onions it might be due to bad brining leading to retention of yeast-like micro-organisms and/or bacteria within the tissue layers of the onions. If this is the case, it is best to remove the cloudy brine by draining *via* the bung-holes of the casks and after a rapid rinse in water (by filling the casks and draining immediately) replacing by 8 per cent. acetic acid. The defect might possibly be due to too low acidity in the finished pack in jars. The acidity (after equilibrium has been attained) should be 3½ per cent. minimum and is achieved by either putting non-acid onions in 7 per cent. (fortified) vinegar or putting 3 per cent. acid onions (onions previously put into 6 per cent. acetic acid solution in casks) into 5 per cent. malt vinegar, giving a product, after equilibrium has been reached, of 4 per cent. acidity.

If the onions are "raw," the difficulty will probably be remedied by using vinegar (fortified by acetic acid to 7 per cent. acidity) giving an acidity of 3½ per cent. to the final product.

Manufacture of Pectin Extract

B.8791. *Could you please give us some information on the manufacture of pectin extract.* (London.)

Some jam factories produce their own pectin extract as a by-product. This is a good proposition if waste material—as, for instance, press residues from apples, gooseberries, or red currants—is available. Windfalls or cider apples are equally suitable for pectin manufacture.

Press residues can be used either fresh, dried, or preserved with sulphur dioxide. The main item of equipment is a specially adapted steaming barrel, made of oak or well-seasoned pine, fitted with a perforated steam coil, and having a tipping arrangement similar to a jam pan. The barrel has one outlet, which is covered on the inside with a fine metal gauze acting as a strainer. Other items are a fruit press, filters, and finally a vacuum pan. Filters working with compressed air are of great advantage, but if no such facilities are available, sugar bags nailed on frames may be used for filtration.

When made from residues, these are loaded into the steaming barrels with double their quantity of water. It is advisable, but not absolutely necessary, to leave the residues to soak for several hours. After soaking, 50 to 100 g. of tartaric acid per cwt. of material is added, and the whole boiled for 30 minutes. The mixture must not be transformed into a pulp, otherwise pressing and filtration will be difficult.

After boiling, the juice is drained off, mixed with 0·4 to 0·6 per cent. of decolorising carbon, and filtered while still hot. The filtered juice is kept in a separate cask or tank, and the remaining material poured into a bogie or other container, pressed, and subsequently filtered with decolorising carbon. A third extraction of the material in an autoclave under pressure yields still more pectin, but is not economical when working on a small scale.

After filtration, both juices are mixed and concentrated to one-fifth of their volume in a vacuum pan. The finished product is usually a brown-coloured viscous extract with a pectin content of about three or four per cent. The extract can be preserved in the usual way with sulphur dioxide. If cloudy, it will settle on standing for a period of five to six weeks.

If fresh green apples are used as the raw material, they should be sliced on a cutting machine and subsequently pressed. The fresh juice is filtered and kept separate in order to be mixed with juices produced by heat extraction. The press residue is treated in the same way as described above.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.5739. *Oils and fats.* (Lancs.)
B.5741. *Conveyor belt.* (Lancs.)
B.5743. *Levulose, fondant, sweetened fat, and cream filling for wafer biscuits.* (Scotland.)
B.5744. *Frozen confections and fat extenders.* (Ireland.)
B.5746. *Lactose from whey.* (N. Ireland.)
B.5749. *Fats for frying doughnuts; glyceryl monostearate.* (Ireland.)
B.5751. *Mineral waters.* (Ireland.)
B.5752. *Mincemeat.* (Ireland.)
B.5753. *Dehydrated vegetables.* (America.)
B.5754. *Semi-automatic labelling machine.* (Derbyshire.)
B.5756. *Filtering and straining viscous liquids, such as treacle, malt extract, syrup, and glucose, and plastic buckets suitable for liquid and fat storage.* (N. Ireland.)
B.5757. *Monosodium glutamate.* (U.S.A.)
B.5758. *Tapioca flour.* (London.)
B.5760. *Preservation of malt vinegar.* (Yorks.)
B.5761. *Pig stunning tongs.* (S. Australia.)
B.5762. *Milk analysis units and pasteurising plant.* (Ceylon.)
B.5763. *Rotary sleeve valves.* (Devon.)
B.5766. *Popcorn.* (Lancs.)
B.5767. *Carton glueing.* (Ireland.)
B.5770. *Three-sink units.* (Surrey.)
B.5771. *Electric branding irons for bacon and ham.* (Kenya Colony.)
B.5772. *Mechanical poultry pluckers.* (Warwick.)
B.5775. *Dehydration of plums.* (Warwick.)
B.5776. *Potato products.* (London.)
B.5789. *Fruit cakes.* (France.)
B.5790. *Powder cleanser.* (British West Indies.)
B.5792. *Lye peeling of peaches.* (France.)
B.5796. *Rice flakes.* (Midlothian.)
B.5797. *Heat sealing.* (Berwicks.)
B.5798. *Emulsifiers and stabilisers.* (Ches.)
B.5800. *Custard and pudding powders.* (Belgium.)
B.5801. *Fondant.* (Suffolk.)
B.5803. *Rennet powder.* (Lancs.)
B.5804. *Dehairing pigs.* (Ceylon.)
B.5805. *Soups.* (Ireland.)

Information Required

B.5814. *British suppliers of cellulose yeast for forage.* (Lancs.)
B.5826. *Suppliers of butter flavouring known as "Butterette."* (Surrey.)

Recent Patents

671,838. ELECTROLUX, LTD.: Absorption refrigerating apparatus.
671,860. SAFETY PRECISIONS, LTD.: Safety closures for bottles and other containers.
671,895. MANN, J. D.: Filter for filtering coffee or other liquids.
671,899. NAAMLOOZE VENNOOTSCHAP CICERO CENTRALE INDUSTRIELE CONTROLE EN RESEARCH ONDERNEMING: Lid sealing means.
671,922. NYROP, J. E.: Process for the destruction of micro-organisms, viruses and the like in liquids and tissue of vegetable and animal origin.
671,933. METAL BOX CO., LTD., LYONS AND CO., LTD., J., and JACKSON, J. M.: Covered dish-like metal containers for food.
671,981. MENDLE BROS, LTD.: Covers of jam jars, jam jar holders, and the like.
672,035. HARDIE, G., and HARDIE, B. G.: Manufacture of sausages.
672,063. BRODRENE GRAM AKTIESELSKABET: Apparatus for the portion of ice cream filling ingredients.
672,117. FOURNIER, F.: Milling cutter.
672,131. FOWLERS DAIRY DEVELOPMENTS, LTD.: Heat treatment of liquids in bottles.
672,135. SCOTTS ENGINEERING (NEWPORT), LTD., and BURDIN, N. V.: Controlling machines for handling bottles and the like.
672,211. RESEARCH CORPORATION: Synthesis of vitamin A.
676,379. SOC. ANON. PRIMO ISTITUTO DIETETICO ITALIANO R. ROSSI: Moulding of dough or paste in the production of bread sticks or rolls.

Abstract of a Recent Specification

Decaffeinated Coffee

It is relatively easy to remove, say, 90 per cent. or more of the caffeine from coffee beans. One difficulty in making an acceptable product, however, is to retain a satisfactory coffee flavour. Another difficulty is the large investment required for profitable operation; the operation is one involving the processing of large amounts of solid and liquid material in relatively expensive equipment and must be carried out on a large scale to show a profit under competitive conditions.

Two types of commercial process have been developed—the "dry" and the "wet" process. The former has been applied exclusively, as far as known, to green unroasted coffee.

In none of these processes, however, is the particular combination of features to be found which characterises the process.

One object of the invention is to provide an economical process for decaffeinating coffee.

Other objects are to provide a decaffeinating process in which the decaffeinating step is applied to a relatively concentrated extract of roasted coffee, and to provide a process especially suited to the production of soluble decaffeinated coffee.

In accordance with the present invention, the process comprises forming an aqueous extract of ground roasted coffee beans which contains at least 40 per cent. by weight of soluble coffee solids comprising water-soluble and water-dispersible coffee constituents of beverage value, extracting caffeine therefrom by contact of the aqueous extract with a water-immiscible organic solvent for caffeine until at least 90 per cent. by weight of the caffeine has been removed from the aqueous extract, separating the decaffeinated aqueous extract from the caffeine-laden solvent, and removing residual organic solvent from the decaffeinated extract.

The present invention also provides a process of decaffeinating soluble coffee, which comprises extracting ground roasted coffee beans with hot water to produce a concentrated aqueous extract containing at least 40 per cent. soluble coffee solids including caffeine and water-soluble and water-dispersible coffee constituents of beverage value, continuously feeding into a column a water-immiscible organic solvent for caffeine having a specific gravity different from that of the aqueous extract, continuously dispersing the aqueous coffee extract at a reduced temperature in the form of fine droplets into the solvent in the column at such a point as will permit travel of the droplets by gravity through the major part of the height of the body of solvent and the formation of a layer of aqueous extract at the end of their travel, whereby caffeine is extracted from the aqueous extract by the solvent, continuously removing decaffeinated aqueous extract from the aqueous extract layer, continuously removing caffeine laden solvent from the end of the column remote from the aqueous extract layer, and removing residual solvent from the decaffeinated extract.

The aqueous extract is extracted with a volatile organic-water-immiscible solvent for caffeine such as benzene, a chlorinated hydrocarbon such as methylene chloride, di- or tri-chloroethylene, or ethylene chloride, or other commercially available water-immiscible caffeine solvent.

In this process the decaffeinated extract and solvent-caffeine solution are separably withdrawn from the top and bottom of the extraction vessel. In the case of extraction columns it is preferred to do this continuously, but the extraction can also be carried out batchwise.
660,837. *American Home Foods, Inc.*

Trade Marks

KESTER.—695,238. Edible oils. **C. M. Keyworth and Company, Limited,** Barnfield Works, off Newcastle Road, Leek, Staffordshire; Manufacturers and Merchants.
ROCHE.—698,706. Chemical substances for use as nutritive additions to cereal food preparations in the course of manufacture. **Roche Products, Limited,** 40, Broadwater Road, Welwyn Garden City, Hertfordshire; Manufacturing Chemists.
GRUNO.—701,213. Meat and meat products for food for human consumption. **Kraft and Co.** (a Commanditaire Venootschap existing under the laws of the Kingdom of the Netherlands), Noorderkerkstraat, 5, Groningen, Holland; Manufacturers and Merchants.
MALGA SNOW-ICE.—704,012. Preparations of sugar for icing and filling confectionery. **Malga Products, Limited,** Bridge Road, Southall, Middlesex; Manufacturers.
BLUNYL.—704,501. Protective clothing against accidents or injury. **James North and Sons, Limited,** Godley Mills, Hyde, Cheshire; Manufacturers.

Recent patents and trade marks have been selected from the "Official Journal of Patents" and the "Official Trade Marks Journal" and are published by permission of the Controlier of H.M.S.O.

New Companies

Doms Ices, Limited. (505218.) 83, St. Mary Road, Walthamstow, London, E. 17. To take over the business of an ice cream manufacturer carried on by Domenico Capaldi, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: D. Capaldi, 9, Grovelands Road, London, N.13; J. Del Greco, 38, Westerham Avenue, London, N.18.

O. and W. Morley, Limited. (505290.) Summer Lane, Wombwell, nr. Barnsley. To carry on business of manufacturers of and dealers in jam, honey, marmalade, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: O. Morley, 193, Summer Lane, Wombwell; W. Morley, 159, Summer Lane, Wombwell; F. C. Morley; and E. Morley.

Soya and Protein Products, Limited. (505514.) To carry on business of manufacturers of and dealers in soya bean flour, soya and protein extracts, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: J. C. Ferree, Merrywood, Ellerton Road, London, S.W.20; W. A. Woollam, 27, Cadogan Street, London, S.W.3.

Tested Package Company, Limited. (505517.) To carry on business of consultants, or advisers, operators, manufacturers, importers of and dealers in tools, implements, and machinery; coopers, manufacturers of and dealers in barrels, kegs, drums, etc. Nom. cap.: £100 in £1 shares. Dirs.: not named. Subs.: J. H. Akester and Mrs. E. Akester, Hazelwood, Beech Street, Bingley.

Albert Evans and Son, Limited. (505528.) 2, Cross Lane, Salford, Lancs. To carry on business of mill fitters, furnishers and contractors, etc. Nom. cap.: £3,000 in £1 shares. Permt. dirs.: A. Evans and Isobella Evans, 23, Edale Grove, Ashton-on-Mersey, Cheshire; A. R. Evans, 52, Grange Road, Sale, Cheshire.

S. Esposito and Sons, Limited. (505604.) To carry on business of manufacturers of ice cream and confectionery, caterers, hotel proprietors, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: P. G. Esposito, 13a, Prestwold Road, Leicester; D. Esposito, 159, Martin Street, Leicester.

Coolth, Limited. (505664.) To carry on business of manufacturers of and dealers in machinery and apparatus of all kinds used for the purpose of cooling or refrigerating liquids or substances, etc. Nom. cap.: £500 in £1 shares. Dirs.: to be appointed by subs. Subs.: J. F. Thomasson (banker) and G. E. Borrett (investment manager), 3, Lombard Street, London, E.C.3.

Protamin, Limited. (505679.) To carry on business of manufacturers and importers of and dealers in nutritional concentrates and foodstuffs, analytical and consulting chemists, etc. Nom. cap.: £100 in £1 shares. Dirs.: not named. Subs.: J. B. Gowman and C. J. Pollard (clks.), 11, Old Jewry, London, E.C.2.

Jose Sanz (London), Limited. (506077.) 70, London Fruit Exchange, London, E.1. To take over business of a fruit and vegetable importer carried on at London Fruit Exchange, London, E.1, as "Jose Sanz, London." Nom. cap.: £15,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: J. C. Delany and Mrs. E. M. Delany, 8, Frognal Gardens, London, N.W.3.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.